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MODERN MILK GOATS

LIPPINCOTT'S FARM MANUALS

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LITTLE FRIEND OF ALL THE WORLD.

MODERN MILK GOATS

STATUS OF THE MILK GOAT INDUSTRY. METHODS OF PROFITABLE MILK PRODUCTION. CARE AND MANAGEMENT OF COMMERCIAL HERDS AND HOUSEHOLD GOATS.

BY

IRMAGARDE RICHARDS

PRESIDENT CENTRAL CALIFORNIA MILK GOAT BREEDERS' ASSOCIATION

76 ILLUSTRATIONS

PHILADELPHIA AND LONDON
J. B. LIPPINCOTT COMPANY

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PHILADELPHIA, PA.

DEDICATED

WITH THE LOVING DEVOTION OF THE AUTHOR

TO

THE LITTLE FRIEND OF ALL THE WORLD

10415

PREFACE

THE much ridiculed goat of our back alleys is rapidly disappearing, and in her place has come to stay the trim well bred milk goat of Swiss and English origin, an attractive animal in appearance, and highly efficient as a milk producer. She has entered the field of American stock breeding in response to several different and definite needs of modern American life.

The passing of cheap and abundant land, the consequent crowded and intensive conditions of agriculture, and the further consequence of soaring prices for dairy products, have created a demand for an animal that produces milk more economically than the cow and under conditions where a cow could not be kept. This demand the well bred goat fulfils.

The spread of tuberculosis, a disease whose germ is often carried by the cow and her milk, creates a demand for a milk producing animal that is resistant to this disease. Again, the goat answers the need.

The statistics of infant mortality, at last frankly faced by our modern leaders of social welfare, call for a food that will save the lives of children who cannot survive on the general substitutes for mother's milk. This

greatest need of all is best filled by the milk of goats, with its close approach to human milk and its beneficent curative qualities.

One cannot afford to remain in ignorance of such a real factor in our present agricultural and economic life. This book is written in the hope that it will give not only the required information concerning the new and growing industry of milk goat breeding, with its by-products, but also such complete instructions on the care of these little animals that no one, however inexperienced, need deny himself the profit and pleasure of possessing his own milk goat.

In the preparation of this book another purpose has been held in mind. In many of our high schools, courses in agriculture are being introduced, and even grade schools are giving their pupils an opportunity to study the underlying principles of agriculture. Until this time there has been no text-book meeting the need of those students who desire to take up work along the lines of milk goat raising. This book has been prepared with a view to furnish students in the schools and colleges an opportunity to gain further knowledge along this line of Animal Husbandry.

In this connection I wish to express the most sincere and grateful appreciation for the assistance of Professor Edwin C. Voorhies, of the Animal Husbandry Depart-

ment, University of California. Professor Voorhies has been at pains to criticise the manuscript and to offer suggestions with a view to perfecting the book for class room use. To his able assistance it will owe in large measure its usefulness for this purpose.

No less grateful acknowledgment is offered for the help of Dr. Carl W. Fisher, V.S., D.V.M., of San Mateo, California. His painstaking review of the chapter on the Health of Goats gives me confidence that this portion of the book will be of special value to everyone who owns a goat.

Most of all, thanks are due to Miss Morris Wagner, my partner in the goat business. Her wide experience in the care of goats, and her exacting criticism of these pages, have given the book whatever merits it may possess as a practical guide and manual.

Thus sponsored, it goes out to meet these varied needs, in the hope that it will do its part to serve the interests of the milk goat industry and the welfare of American childhood.

IRMAGARDE RICHARDS,
"Las Cabritas,"
Montara, California.

April 1, 1921.

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MODERN MILK GOATS

CHAPTER I

THE SO-CALLED "NATIVE GOAT"

The Goat in the Old World.—The history of the goat in the Old World, in Asia, Africa, and Europe, goes back as far as the history of man himself. The goat seems to have been one of the first animals to be domesticated. It is found associated with man in the earliest traces of human existence, and its place of economic importance has been persistent and unquestioned throughout the recorded history of these continents.

Early Importations to the American Colonies.—It is curious that since the coming of the European races to this continent the milk goat has played so small a part in the development of American life. The domesticated goat was unknown to the North American Indian. But in the records of the earliest settlements in New England and Virginia the goat plays no small part. Goats were included in the list of animals brought over by Captain John Smith and by Lord Delaware. Frequent mention is made in the early annals of the colony of the fertility and rapid increase of the milk goats. In 1620 we find the record of a contract for the shipment of 400

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choice milk goats from Wales to Virginia. Similarly in the record of New England we find many references to goats and to the methods by which they were handled. But by the middle of the seventeenth century goats appear less and less frequently in the records of these two typical colonies, while the rapid growth of interest in other forms of live stock, especially horses and cows, is indicated by abundant data.

The Degeneracy of the Goat in America.—It is plain, then, that in spite of these records of goat importations the interest of the settlers centered rather early in dairy cows. In the subsequent history of American agriculture we note the rapid and admirable development of the various breeds of cows, while the goats, few in number, were until recently pushed to the background. They became objects of scorn and derision, leading a precarious existence for the most part in the suburbs of large cities, in the hands of the later Irish and Mediterranean immigrants of the poorer class.

It is these outcast inhabitants of the back alleys and outskirts of our cities, the neglected descendants of the English and Welsh stock of our earlier settlers, that have come to be known as the " native " or " American " goat, answering also to the epithets " common " or " scrub " goats, to distinguish them from our more recent importations of valuable and highly bred milk stock.

Reasons for This Degeneracy.—Why were they so indifferent to the goat, these early settlers of the Atlantic seaboard? Why did the milk goat, elsewhere so honored and valued, fall into such obscurity in the United States? The answer is found in certain fundamental laws which govern the development of agriculture as a whole.

FIG. 1.—A "native" goat, showing the results of many generations of neglect in breeding and selection. The milk type has been lost, the udder is almost invisible, the body awkward and heavy, the goat rough.

Goats attain their greatest importance at the two extreme stages of agricultural progress—the first and the last—the primitive nomadic stage and the final crowded, frugal, and highly intensive stage. During the first stage agriculture is still undeveloped and unstable, and herds must depend for their sustenance upon range feed-

ing rather than upon the products of the tilled fields. Into this stage the hardy, light footed goat fits admirably, sustains herself successfully, and makes a valuable return for the efforts of the primitive husbandman. The development of the dairy cow, on the other hand, does not attain importance until conditions are stabilized to such an extent that an abundant and dependable amount of feed can be produced for her, to supplement her own efforts at forage.

Such conditions existed and were admirably developed in England and Holland, the homeland of most of our first colonists, at the time that our country was being settled. These colonists, trained husbandmen, found in their new homes for the most part such generous soil, such favorable climate, and such an abundance of cheap and fertile land, that the maintenance of the cow, from the beginning of our history, was easily provided for and assured. In such a type of agriculture the dairy cow found conditions the most favorable possible for her development. Therefore, it is not strange that the goat, as a milk animal, fell into oblivion in the United States, although she maintained unbroken her prestige in the more crowded civilization of the Old World.

Early Spanish Importations.—Meanwhile, in the vast countries to the south and west of the colonies a very different kind of goat history was in the making.

Mexico, California, and the adjacent regions were being explored and settled by the Spanish, a race of people who in their native home, with its mountainous regions

FIG. 2.—Doe from the Navajo Indian reservation, showing the survival of milk type among the goats of the Southwest. (Courtesy of C. B. Allaire, San Antonio, N. M.) There is a current belief that among the goats of the Southwest there is found a strain that originates in the Island of Malta. There was actually one importation of Maltese goats made to this country, but owing to the appearance of Malta fever among them, these animals were destroyed as a precautionary measure. However, a good many goats in this region show in some degree the drooping ears and the pendulous udder that are said to be characteristic of Maltese goats. These points appear in the animal pictured above. Doubtless the stock imported from Spain during the centuries of the Spanish settlements did include some infiltration of Maltese blood, which still appears in occasional instances, although the goats of the Southwest are prevailingly Alpine in type.

and semi-arid areas, had always held in high esteem the little milk animals who fitted best into the environment of their country. Wherever the Spanish settlers went, the goat followed them. She found in this vast new land of mountains and high plateaus conditions not unlike those of her native home. Whether she was turned loose to go back to the care of Mother Nature and her own wits, or whether she remained in the care of man, she prospered and increased. Lacking expert care, she increased, to be sure, in numbers rather than in excellence of type. Still it is remarkable that in the great bands of "native" goats that range Mexico and the Southwest to-day, there are many animals that persistently maintain the dairy type, and that respond to care and attention with an excellent yield of milk, although in the semi-wild conditions of their life for the past two hundred years they have been bred solely for their meat and hides. Yet these multitudinous descendants of the Spanish goats of the early settlers were destined to play an important part in the development of the milk goat industry of the United States, whose own goats, few in number, were despised and neglected.

Dawn of New Interest.—With the coming of the twentieth century, the wiser leaders of our agricultural life were already beginning to see ahead of us those crowded and intensive conditions in which the milk goat

again comes into her own as the superior of the dairy cow. For where space is at a premium, and feed is costly, the well bred goat proves her ability to produce milk on smaller rations per gallon than any cow, and she fits happily into many situations where her larger and more clumsy rival could not exist.

So in spite of the low estate into which the milk goat had fallen in the United States, we find as early as 1898 that the Department of Agriculture was aware of her possibilities, and was making an effort to rouse interest in the subject. So poor, however, were the prospects offered by the stock in this country, now called the "native" or "American" goat, that the eyes of the champions of the milk goat turned towards Europe, and especially towards Switzerland, as a source for supplying the need which they foresaw.

QUESTIONS

1. How far back in history do we find the goat mentioned?
2. Tell what you can of the goat importations in colonial times. What became of these importations?
3. Discuss the reasons as to why milk goats did not make progress in the U. S. during the 19th Century.
4. How has the development of the dairy cow industry differed from that of the milk goat?
5. What success did early Spanish importations meet with in North America?
6. Name at least three reasons for the renewal of interest in the milk goat during the 20th Century.

CHAPTER II

IMPORTED MILK GOATS

Origin of the Swiss Breeds.—In Switzerland, more than in any other European country, goat breeding for milk production only had been carried to the highest point of careful and successful selection. Out of the common stock of Alpine goats, which found in the Alpine meadows the natural environment best suited to their development, the Swiss breeders of the different cantons had chosen certain types, and in their isolated valleys, generation after generation, had patiently bred to establish an ideal which they had always before their eyes.

When the first goat pioneer from the United States visited Switzerland to investigate the field, he found a great many breeds, all in an advanced stage of development as distinctive types. Examination of them all led to the conclusion in the mind of the investigator that two breeds offered the highest possibilities as a source for building up the goat industry in America. One of these was the Saanen, originating in the Saanen and Simmen Valleys, in one of the northern cantons. This type had

been selected by its creators for the following points: large size, heavy milk yield, naturally hornless heads, and a pure white color. The other breed that aroused admiration was the Toggenburg, bred in the Toggenburg Valley, and selected for exactly the same points as the Saanen except in color. The Toggenburg is brown, with characteristic markings in white, described in detail elsewhere.

Importation of Swiss Goats.—As a result of these investigations, in 1904 the first importation of Swiss goats arrived in the United States, 10 Saanens and 16 Toggenburgs. In the following two years 39 Saanens and 141 Toggenburgs were imported. After that date, the United States, because of the prevalence of hoof and mouth disease on the continent of Europe, placed a quarantine on live stock from abroad, and further importations from the continent ceased.

Rapid Increase.—Those Swiss goats which had arrived before the embargo was established were widely dispersed by sale throughout the United States. Although many of the original animals died shortly after their arrival because of the hardships of the trip, for the most part they did well, and their beauty of type and heavy milk production won favor for them wherever they went. Herds of milk goats, formed from the pure Swiss stock and from grade animals, crosses between our

native does and the pure Swiss bucks, began to appear in many parts of the country. The imported goats seemed to adapt themselves readily to all the varieties of our climate, and increased vigorously, but it was very soon apparent that the western states, and notably California, were destined to take the lead in this new industry.

Famous Imported Bucks.—For in the dispersal of the original importations several groups went directly to California, and shortly afterwards other animals were acquired by purchase, so that as early as 1908 there was already in that state a considerable number of the pure bred does and a group of bucks who have made history as the founders of large and valuable herds. In this list the preëminent names are William Tell 172, the Crown Prince of the Sceni 140, Chieftain 281 and Prince Bismark 159, all Toggenburgs, and Andreas Hofer 177, a remarkable Saanen buck.

California Herds.—The rapid increase of the California herds is probably due to a combination of factors that have been singularly favorable to this industry. First, the dry, even climate and the abundance of feed, both wild and cultivated, offered conditions that were almost ideal for the maintenance and development of the milk goat. In addition to these natural advantages, the character of the population influenced the new industry favorably. For California is notably a land of wide

spreading cities and towns, of small homes set in rather generous spaces, homes that more and more tend toward the economic independence of a garden, chickens—and a milk goat. So that the demand from the beginning has constantly outrun the supply, although conditions were so favorable for increasing the supply.

But the factor that has probably counted most in the rapid development of the California herds was the presence in that state and adjacent regions of the large numbers of " native " Mexican goats, whose origin we have already noted. Although these animals since their importation into America had received very little attention as to care or breeding, still they certainly are in the main a better type of milk goat than the " back alley " goat of our other states, and respond more readily to the process of " grading up " by the use of Swiss bucks. It has been stated by a member of the Mexican State Department of Agriculture that at the time of the early Spanish settlements in America Spain was in close commercial touch with Austria, and that she had drawn largely upon the Austrian Tyrol for the goats exported to America. If this is true, these Mexican goats of today would trace their origin to the same Alpine stock from which originally the Saanens and Toggenburgs sprung. This common origin of race might well account for the success with which these Mexican does grade up

to the Swiss bucks, both in type and productivity. But the goats of our other states, largely English or Irish in origin, being island types, might not so readily unite with

Fig. 3.—Chieftain 281, a famous imported Toggenburg buck. (Courtesy F. F. Heintz, Los Angeles, Calif.)

the Alpine stock to produce a successful cross. Aside from their origin, however, the large numbers of these Mexican does available was in itself a valuable asset to the growing western herds.

Importation of Anglo-Nubian Goats.—In addition to these various advantages, California soon received another vigorous stimulus to her milk goat industry of quite a different sort. In 1909 a new breed came into

FIG. 4.—Scriventon Bellerophon, 716. The buck imported in 1913 by Dr. Gregg from England. (Courtesy Widemann Goat Milk Co.)

the field to claim attention and to make its contribution, remarkable out of all proportion to the number of animals imported, three Anglo-Nubian goats, brought in from England by Dr. Gregg, of San Diego: a buck,

Holly Lodge Shingle, and two twin does. To the herd that rapidly grew out of this small beginning Dr. Gregg added, in 1913, another buck and doe from England.

Fig. 5.—A very remarkable doe. Taken as a wild goat from the Guadalupe Islands, gave over a gallon of milk when fresh and 1600 lbs. of milk in 310 days, showing survival of milk type in the wild Mexican herds.

The Anglo-Nubian breed to-day numbers over a thousand registered animals, pure breds and grades, and all are descended from the five named above. The Anglo-

Nubians have had to stand the test of the closest inbreeding, but in spite of this handicap they have made good their claim to preëminence as a profitable milk breed, while the richness of their milk and the extraordinary beauty of many individuals have won them the most enthusiastic admiration.

Again, in 1913, two prize winning Saanen goats surmounted through long quarantine the strictness of our embargo on continental live stock, and found their way to California. This pair, Alta Franz and Alta Jaure, have made a rich contribution to the Saanen blood of the country, and especially have added an impetus to the growth of this breed in California.

Milk Goat Record Associations.—Although the most immediate development of the milk goat industry was in the West, it is making astonishing strides in every part of the United States and our island possessions as well. The evidences of this development are many. Most notable is the foundation and rapid growth of the registry associations. Very shortly after the 1905 importations the American Milk Goat Record Association was established, and to-day, fifteen years later, it numbers more than 8000 registered milk goats. The careful system of registry of this association has guarded successfully the pedigrees of the pure bred stock. Although breeders would covet the opportunity to obtain new blood for

FIG. 6.—Alta Franz, 807, imported Saanen buck. (Owned by Mrs. Inez Glahn.)

FIG. 7.—Alta Jaure, 808, imported Saanen doe, eight quart yield. (Owned by Mrs. Inez Glahn.)

their herds from the original source, still, so careful has been the use of the available strains that neither of the Swiss breeds at present shows the least signs of degeneracy from inbreeding. On the contrary, all the evidence points clearly to the conclusion that these two breeds, preserved in their purity in American hands, have made substantial advance in size, weight, and productivity over their Swiss forebears.[1]

The Anglo-Nubians of the original importation were registered in this same association, the A. M. G. R. A., but in 1916 the International Nubian Breeders' Association was formed to advance the interests of this breed and take care of its registries. It is now in the second thousand of its recorded animals.

Milk Goat Journals.—The interest in the industry is further reflected by the number of contributions on the subject, found in all sorts of current publications, contributions that are no less remarkable for their number than for their tone of respectful admiration. Many years ago the "Angora Journal," of Portland, Oregon, established a department called the Milk Goat Bulletin, and this department has so grown in scope that the title

[1] In the fall of 1919 two or three different groups of persons purchased Saanen and Toggenburg stock in Switzerland and, accepting the difficult conditions imposed by our quarantine laws, succeeded in importing a number of animals, although all of the importations suffered rather heavy losses on the journey. Breeders of the Swiss goats in America are looking with interest to this new blood, which will simplify our problems of breeding and will no doubt greatly strengthen the industry.

of the publication has recently been changed to "The Angora and Milk Goat Journal." In 1916 a new periodical, the "Goat World," was started at Baldwin Park, California, devoted exclusively to the interests of the milk goat, and the growth of its circulation is a good indication of the rapid progress of the industry.

Goat Milk Condensary.—The demand for goat milk for infants in cities where the fresh milk was not easily obtained led, in 1915, to an experiment in condensing goat milk. A large herd of goats was collected at King City, Calif., a condensary was built, and the milk was soon on the market. It met with great success, and the herd and condensary have recently been enlarged, and a plan is under way to establish in the neighborhood a community of goat breeders, their herds to be contributary to the condensary.

Milk Goats at Live Stock Shows.—Another evidence of the growth of interest in the industry has been shown in the live stock exhibitions of recent years, where the milk goat has become an accepted and important feature, and one that is sure to be a crowded center of attraction.

The progress thus made, in less than fifteen years, from the despised alley goat of the poor immigrant to this vigorous and prosperous industry representing an impressive amount of invested capital, augurs well for the future, when we shall confidently expect

the American milk goat to assume, if not to surpass, the place of economic importance so long held by her European cousin.

QUESTIONS

1. Discuss the origin of the Swiss breed of goats.
2. What breeds of Switzerland were selected to build up the goat industry of the U. S.? Why were these breeds selected?
3. About when were the first modern importations of Swiss goats made? How have these fared?
4. Name three pure bred bucks, together with the breed to which they belong, who have influenced the pure bred industry.
5. Name several factors which have enabled California to become foremost among states in the development of the milk goat.
6. How do you account for the fact that Mexican goats are easily "graded up" by the use of pure bred Swiss bucks?
7. When were Anglo-Nubians first imported into the U. S.?
8. In what associations are pure bred milk goats registered?
9. Give several illustrations of activities which tend to show the great interest being taken in milk goats.

CHAPTER III

THE POPULARITY OF MILK GOATS

What Explains Their Popularity?—What are the factors that account for this sudden rise to favor of the long neglected milk goat? There are several, but first of all in importance is the growing realization that goat milk has a special quality and value quite different from that of cow milk.

Quality of Goat Milk.—*The Taste.*—In the great majority of cases goat milk cannot be distinguished from the best cow milk, except by its superior richness and its pure white color. The common prejudice against it probably has its origin in the fact that until lately the goat in the United States was for the most part in the hands of ignorant or careless people, who did not keep the goats' quarters properly clean, or who fed them improperly, and worst of all, who often kept a buck, or billy goat, with or near the does. A properly cared for doe is absolutely free from odor, even more so than a cow; but this is not true to the same extent of the buck, especially in the breeding season. The odor of uncleanly quarters, or of the buck, is promptly absorbed by the milk, and gives it such an unpleasant taste that many persons are sure they could never use it. This unfor-

tunate prejudice can usually be dispelled by one glassful of sweet, clean, rich milk from a goat that is properly handled. To one who has had the opportunity of using goat milk, cow milk becomes more or less distasteful, seeming thin and flat to the palate accustomed to the more delicious milk of the goat.

The Richness.—The milk of common goats, goats with some Angora blood, and Nubian goats usually tests very high for butter fat, running often from 6 per cent. to 8 per cent. The heavier milking Swiss breeds run from 3.5 per cent. to 5 per cent. Detailed analyses of goat and cow milk will be found in Appendix A.

An Ally Against Tuberculosis.—The palatability and richness of the milk thus recommend it for general family use. It has other qualities, however, of even greater importance. It does not carry the germ of tuberculosis, as does so much cow milk, because the goat is practically immune to that disease. It is thus of the greatest value in preventing the spread of tuberculosis. More than that, goat milk has proved its usefulness in rebuilding the destroyed tissues and even in establishing some measure of immunity against the tuberculosis germ. The City of San Francisco has a contract for a daily supply of goat milk for the tubercular patients of its great City Hospital, and its usefulness in fighting the disease has been well tested and proved.

Special Curative Qualities.—Other special qualities make it of inestimable value for infants and invalids.

FIG. 8.—"Feel our muscle!" A sturdy lad who owes his recovery from difficult digestive conditions to a diet of goat milk.

Briefly summed up, they are as follows: the fat is contained in the milk in a much smaller globule than that

of the milk of cows. It is, therefore, much more easily penetrated by the digestive juices of the stomach.

In the case of cow milk, the peristaltic action of the stomach under some conditions will throw the large fat globule against the wall of the stomach, where it is held, more or less incapable of digestion. But the very small fat globule of goat milk, held in a more perfect emulsion, is quickly and perfectly digested by the most delicate stomach. This one characteristic seems actually to mean the difference between life and death for many little babies and invalids.

Other differences between goat milk and cow milk are: the fact that goat milk is alkaline in its reaction while cow milk is acid, a matter of the greatest importance to persons suffering from hyperacidity of the stomach, and that the curd formed by goat milk is small and floculent, while that formed by cow milk is larger and quite tough. Again, in many instances, goat milk has proved to be quite laxative in its effect for children who suffer from improper elimination, establishing regular and normal conditions. Goat milk, in short, has proved to be almost a specific for all infants that are not nursed by their mothers, for all other infants or children who have difficulty in digesting or assimilating their food, in all cases of malnutrition, for adults suffering from diseases of the digestive tract, for tuberculosis pa-

tients, and for persons convalescing from all kinds of sickness who need to have their impoverished bodies rebuilt with the greatest possible speed and ease.

Quantity Yielded.—Next in importance as a factor accounting for the popularity of the goat is the low cost

FIG. 9.—California Gretel, a pure bred Toggenburg owned by the University of California, showing the amount of milk she produced in 10 months, 32 ten gallon cans full. This doe holds the world's record for milk production over all animals, goats or cows, in proportion to body weight,—2900 pounds in one year.

of production of goat milk as compared with cow milk for the family milk supply. In this connection the first question to be asked will be, how much milk does a goat give?

A good native doe, or a grade, to be profitable, ought to give two quarts a day when fresh and maintain this

flow for three months or so. She ought to give at least one quart a day up to the seventh or eighth month. Her total yield for the season should be about 800 pounds, or about 95 gallons. This is the minimum yield that will return a fair profit on the cost of maintenance.

FIG. 10.—Las Cabritas Capella, 928, Advanced Registry, 14. Best 24 hour yield, 7 qts. This doe made her high record, well maintained, on range feed, with a very small ration of grain.

A grade Swiss, of three-fourths pure blood or better, or a pure bred doe, will usually run three to four quarts when fresh, maintain three quarts for four or five months, two quarts until the eighth month, when they are usually bred, and after breeding continue to milk for about three months with a gradually diminishing flow. Such a doe will make a season's yield of around 1400 pounds,

or 150 gallons. The best grades and pure breds give over a gallon when fresh and make a season's yield of 2000 to 2400 pounds. Well attested records of daily yields of five and six quarts, or even more, are not infrequent among the better goats, and this yield is often maintained for a considerable length of time. Some of the highest season yields of which we have exact record have been from 2400 to 3000 pounds.

A good grade or pure bred will milk for a surprising time if she is allowed to go on without breeding and if her supply of feed is carefully maintained. Instances are known of goats still giving a fair yield two years after freshening, while sixteen and eighteen months of steady milking are fairly common. A goat that has this ability to continue her flow of milk is of especial value where the milk is needed for invalids or infants.

Low Cost of Production.—What does it cost to maintain the goats that produce these yields of milk? The question will be answered first for the family goat, for she is the foundation upon which the whole industry rests. If a doe is kept entirely in confinement, and all her feed is bought at retail prices, the cost per year may run as high as $35. This is based on present prices (1920), reckoning alfalfa hay at $30 a ton and grain at $50 a ton, and allowing the doe three-fourths of a ton of hay and one-fourth of a ton of grain per annum.

These are probably outstanding figures, both as to amount and price. If the doe has access to a little pasture, brush, weeds or grass, or can be staked out part or all of the time, or can be fed partly from the produce of a home garden, this high estimate can be greatly reduced.

Turning now to the returns she will make on the cost

FIG. 11.—Five does whose aggregate yield at the time of this pose was nearly seven gallons a day, sold at wholesale for 65 cents a gallon, and whose expense for upkeep was 10 cents a day apiece. (Owned by Richards & Wagner, Montara, Calif.)

of upkeep, we can safely credit the average good grade goat with 150 gallons as her annual yield. Retail pasteurized cow milk is selling to-day at 17 cents a quart, and fresh cow milk, certified, retails for 25 cents. Your goat milk has even a higher value than the best certified cow milk, but based upon that price the doe of 150 gallons yield returns annually $150 for the $35 she costs for

upkeep. Under favorable circumstances the cost for feed will be considerably less, and the returns in production in many does runs considerably higher than the figures offered here.

In the household where pasteurized milk would be the basis of comparison, at 17 cents a quart, or 68 cents a gallon, the milk of the doe would be credited at $102, which is still a handsome return over the cost of her upkeep. At the same time, the returns in actual nourishment are very much higher than from the pasteurized market milk with which the goat milk is compared.

Adaptability of Milk Goats.—Another practical advantage of the goat over the dairy cow is that because of her small size and cleanly habits she can be kept in quarters where space is at a premium, and where a cow could not possibly be established. Again, at the other end of the scale, in the wide waste spaces of undeveloped country, herds of goats will make excellent use of land covered with brush and weed growths upon which a cow would starve, but upon which a goat maintains herself in good condition.

Economical Production One Reason for Popularity.—While it is not intended here to give an exhaustive discussion of costs and profits, enough has been said to show that the popularity of the goat rests in part upon her economical use of feed, and her proved ability to

produce the best kind of milk at the lowest possible price under all kinds of conditions.

The Beauty of Well Bred Goats.—In addition to this substantial advantage of milk goats, their popularity is interwoven with two elements of human nature that are no less significant because they cannot be measured in

FIG. 12.—Milk Goats eating with relish a coarse swamp grass, refused by all other animals. This sort of forage alone will not produce heavy milk yields, but, properly supplemented, it is a valuable contribution to the upkeep of the herd.

economic terms. One is our innate love of beauty, and our pride in beautiful possessions. This pride is warmly satisfied by the loveliness of line and color and the grace of bearing that marks the well bred goat.

Value as Pets.—Equally deep seated in every human heart is the desire for small dependent creatures about us upon which we may spend our affection and care—our

" pets," in short. This instinct is not only natural, it is of real importance in the training of young children to kindness and responsibility. Again the milk goat, small in size, dainty in habits, beautiful, docile, and ardently

FIG. 13.—"Her best friend." This little girl, five years old, takes a responsible part in the care of the goats and the kids.

affectionate, perfectly fulfils the requirements for a family pet. She is probably the only animal in the world that serves this function and at the same time makes a handsome financial return to her owners for the cost of her maintenance.

QUESTIONS

1. Name at least five factors that account for the milk goat's rise to favor.
2. Discuss fully the taste of goats' milk.
3. Compare the butter fat content of the Swiss breeds with the Anglo-Nubian.
4. Why is the milk goat an ally against tuberculosis?
5. Compare the properties of goat and cow milk.
6. How do you account for the fact that goats' milk is often found to be superior to cows' milk for children?
7. How much milk should a good grade doe give?
8. For what period of time should a good doe be in milk?
9. Discuss fully as you can the cost of the production of goat milk.
10. What advantages has the goat over the cow?

CHAPTER IV

THE INDUSTRY TO-DAY

Its Substantial Basis.—It is clear, then, that the sudden rise to popularity of the milk goat in the United States is no passing fad, but is accounted for by definite and well established facts—the peculiar and very great value of the milk, the economy of its production, the adaptability of the goat, her beauty, and her desirability as a pet. Out of the steady and increasing demand for milk goats has arisen an industry which, although it is a new comer in the field of American stock breeding, has already made good its claim to recognition. Indeed, so consistent and overwhelming is the evidence in favor of goat milk for infants and ailing children that the work of goat breeding takes on the aspect not only of a legitimate business enterprise, but also of a humanitarian undertaking.

Goat breeders may well feel themselves a responsible and very valuable ally in the present nation wide campaign for child welfare and in the battle against the white plague. This also gives the work a substantial and permanent character, for it is certain that the demand for milk goats and goat milk will never lapse as long as

there are babies and sick folk in the world, but will constantly increase as the knowledge of its benefits becomes more general. More and more goat breeding is appealing to a very intelligent class of people as a profitable and desirable occupation.

The Demand for Stock.—There are thus created two lines of demand: first, the demand from householders for one or more does as the source of the family milk supply, and, second, a demand for pure bred bucks and foundation stock from which to build up commercial herds and goat milk dairies.

The Sources of Supply.—*Pure Breds.*—What is the relation of this demand to the available supply? The man in the market for pure bred bucks finds a fairly large number of well established and reputable herds, each containing a large enough number of pure bred does to insure some culling among the buck kids, and a consequent high standard of excellence among those offered for sale. Such bucks, either as kids or mature animals, find a ready market; such a good market, in fact, that it is at present one of the temptations of the business to keep for stud purposes a good many buck kids that in size and vigor are not really up to proper stud standards.

The best breeders, with a reputation to maintain, cull their bucks pretty severely, and buyers are becoming with time more exacting in their demands, asking

not only that the bucks have a proper certificate, but that he and his immediate family show unmistakable evidences of productivity and vigor.

The supply of pure bred does, on the other hand, is inadequate to the demand, and as long as the present quarantine regulations are in force this will probably continue for some time to be true. For although under our favorable conditions, and in intelligent hands, the pure Swiss and Anglo-Nubian stock is increasing rapidly, this natural increase by no means keeps pace with the growing interest and demand.

Grades.—Fortunately, however, the public is not dependent for its goat milk supply upon the pure bred doe. Poor as was the average "native" goat of the United States, the grade does that have resulted from the use of pure bred bucks of the imported milk breeds are for the most part entirely satisfactory as milkers, and two of them will keep a family adequately supplied with milk throughout the year. The demand for this class of stock, while not so imperative as for the pure bred does, is certainly vigorous and steady, and at present is considerably in advance of the supply. The supply, however, unlike that for pure bred stock, is potentially unlimited. We have available, especially in the West, an abundance of native stock, and the supply of good, pure bred bucks is keeping pace fairly well with

the awakening of interest and initiative in this business of establishing grade herds.

Encouragement has been given to breeders who are engaged in building up grade stock by the action of the American Milk Goat Record Association, which rules that any goat which carries 96⅞ per cent. (31/32) pure blood will be recorded, not as a grade, but as an American Toggenburg, Saanen, or Nubian, according to the sires used in grading up. Each generation must be recorded in the records of the Association and, of course, only registered, pure bred sires may be used. Starting with good native does, ten years will suffice to transform a bunch of "scrubs" into a handsome, typical, and highly profitable herd of American Saanens, Nubians, or Toggenburgs, as the case may be, and the ten year interval of grades will have proved a profitable period as well.

In the increase of these grade herds by the use of pure bred sires lies indeed the future hope of the industry. And it is not only the professional breeder who can contribute to this work—for even the humblest family "Nannies" can be made to do their share in enlarging and improving the supply of milk goats through the intelligent coöperation of their owners and the maintenance of pure bred sires.

So while we must say at the present time that the de-

mand for milk goats somewhat exceeds the supply, we may at the same time say with confidence that in spite of import restrictions the future holds the promise of an

FIG. 14.—El Chivar's Prince Trio, 989, sire of the Advanced Registry goat Loretta, Fig. 29. A buck beyond price, whose value rests upon the performance of his daughters. (Owned by O. H. Freyschlag, San Jose, Calif.)

indefinite and substantial enlargement of the industry, limited only by the intelligence and enterprise of the American people.

Price of Milk Goats.—The price of pure bred bucks

ranges from $100 to $200 for a weaned kid and $300 up for a mature animal. Bucks of established reputations as sires command prices limited only by the purse and determination of the purchaser, as the owners of such sires are not usually anxious to sell. Pure bred doe kids bring at present from $150 up, and few desirable mature, pure bred does change hands for less than $300 to $500. A good grade goat, with a yield of about 1000 pounds to 1200 pounds a season, giving three to four quarts a day when fresh, can usually be had for $50 to $65, the price depending somewhat on the looks of the animal, her conformity to the breed from which she is graded, her registration, whether she is horned, dehorned, or hornless, etc., but on the basis of milk yield alone, the price stated is about what one must expect to pay.

Native goats, with horns, and no special claim to good looks, can sometimes be had for lower prices, and occasionally one finds quite worthy milkers in this class. But the native doe is likely to have a small yield, a short period of lactation, and small teats quite difficult to milk. On the other hand, better goats than those described above, high grades, of good type, and complete registration, with a yield of 1500 pounds to 2000 pounds a season and more than a gallon when fresh, command at present prices ranging from $100 to $125.*

* The prices and conditions quoted above are those which were prevailing during the early months of 1920.

Profits.—*From the Kids.*—If at first sight it would seem that these prices are too high for profitable investment, a little reflection will show that they have a justifiable basis. In the first place, it will be realized that the kids from pure bred stock will have a value in direct proportion to the price of their parents. In the case of good grade does, the doe kids will have a value even higher than that of their dams if a pure bred sire of excellence has been used. This source of income goes far to reimburse the purchaser for the original investment.

From the Milk.—We have already shown that there is a definite margin of profit each year from the milk of a goat at the prices named sufficient in itself to leave a generous net return on the amount invested, even omitting the value of the kids. Moreover, we have given the milk of the doe a value equal only to that of cow milk, whereas in fact its peculiar qualities give it a special value far in excess of the 25 cent quart of milk deposited on the steps by the milkman.

No Labor Costs.—It is quite fair in figuring the cost of keeping a family goat to omit the item of labor. For this labor usually falls within the family and is not actually a cash expenditure. Furthermore, in any family where there are children it is an almost universal custom, based on sound good sense, to keep some kind of animal for pets. The goat, who serves as a pet as well as a food-

FIG. 15.—Las Cabritas Berne, white ribbon on collar, and her twenty-two pure bred daughters, granddaughters, and great-granddaughters, in the female line only. All born within five years. Illustrating the rapid increase of milk goats.

producer, ought not be charged with the labor of caring for her.

Profits from Commercial Herds.—While the points presented apply more directly to the family goat, the goat of the commercial herd can present similar justification for her relatively high price. The rapid increase, the high prices and ready sales commanded for the young stock, the high price and steady demand for the milk, and the economy of production are factors of importance in the profitable management of commercial herds.

Sound Economic Basis of the Industry.—Consideration of all these facts makes it appear that the present range of prices for good milk goats has a sound economic basis, quite apart from the inadequacy of the present supply to the demand, although this factor has a share in maintaining prices at a comparatively high level. The business of goat breeding stands upon a substantial footing to-day, and has the promise of an unbroken and prosperous development for the future.

QUESTIONS

1. Name the sources from which a demand for stock comes.
2. What is the relation of the demand for pure breds to the available supply?
3. Why is the future stock of grade goats unlimited in this country?
4. Describe the method of producing an American Toggenburg, Saanen or Nubian.
5. What are the average prices which one must pay for grades and pure breds at the present time?
6. Name two sources of income from milk goats.

CHAPTER V

ESTABLISHING THE HOME DAIRY

Pure Breds Versus Grades.—The average person who has become interested in goats resolves at once to buy a pure bred or nothing. Investigation usually proves that pure breds are difficult to secure, or if to be found, are held at such a price at present that they are only profitable as breeding stock. But good grade goats, usually very handsome animals and excellent milkers, are more practical as the source of the family milk supply.

The pure bred doe, in order to justify her high price, must produce and raise pure bred kids, bucks and does, and in order to justify *their* high price, and to turn out first-class stock, they must be given such a quantity of milk for the first four or five months as would leave no margin at all for the family, if indeed the one mother gives enough to raise the kids properly.

A grade doe, on the other hand, would have at least 50 per cent. buck kids, which would be destroyed, thus leaving milk enough for the house, even if there be a doe kid to raise. In general, then, it would seem more sensible for a householder to content himself with a good grade doe for family use.

Where to Buy.—It is advisable, if possible, to purchase from breeders of established reputation, and always to obtain with the doe her certificate of registration which states her exact breeding, a certificate of transfer of ownership, and if the doe is in kid, a certificate of service, giving the name and number of the buck used. It will be readily understood that in an industry where the

FIGS. 16 & 17.—A pair of good scrub or native does. Not much for beauty, but they "deliver the goods," and Fig. 16 is a doe whose grade descendents are of considerable beauty and high productivity.

demand is so lively the woods will be full of dishonest dealers, who will sell almost any kind of an animal as a "Toggenburg," a "Saanen," or a "Nubian," but the really reputable breeders keep careful records of their animals, and are likely to value their reputations too highly to attempt to misrepresent stock, and the official certificates of breeding, transfer, and service, signed by the secretary of the recording associations, are sufficient

safeguard to the purchaser. Lists of breeders can be had upon application to the recording associations, and the advertisements in the two milk goat journals are a further guide to the prospective purchaser.

"A Scrub" Doe.—In case the purchaser fails to find even a good grade doe for sale, it would be better to buy a native or "scrub" doe than to do without a goat entirely. Goats of this class can usually be secured around the suburbs of a city, and sometimes a fair milker can be found among them. By the use of a pure bred sire the scrub doe will in a short time be replaced by her half blood daughter, and the purchaser, now in the ranks of a breeder, can congratulate himself on having contributed his share toward improving the milk supply of the nation. This plan has another point to recommend it—the beginner has an opportunity to learn, on an animal of small value, the business of milking and caring for a doe; so if through ignorance any loss occurs, it will be a less serious matter than if he had had to experiment on a more expensive animal.

The milk of the scrub doe, to be sure, is generally deficient in quantity. But if the doe is kept clean—herself, her quarters, and her feed—the quality of her milk will be just as delicious as that of the finest pure bred doe; in fact, it is likely to be richer than the milk of a gallon doe.

Choosing a Goat.—Having located a possible source of supply for his needs, the next question the householder will ask himself will be, "How shall I know a good goat when I see one?" This question will be most helpfully answered by a study of the breed standards printed in Appendix B. These standards were compiled

FIG. 18.—A good family goat. This doe had neither breeding nor good looks to recommend her, but she gave enough milk to raise her little mistress.

with the intention of not only defining the special breed points of an animal, but the points of a good dairy type as well. No matter which of the three breeds one has decided upon for his choice, one will be repaid, if a beginner, by a careful study of all three of these standards, the better to fix in his mind the points of a good dairy animal.

Two Goats Necessary.—For a continuous milk supply for the household two goats are necessary. The breeding season for the Swiss goats is usually limited to the months of August to February, inclusive. The does then come fresh from January to July. Almost any grade doe will give sufficient milk to keep the family supplied for seven months, so it will be seen that two does, bred about six months apart, will provide a fairly even supply for the table throughout the year. Some foresight must be exercised to provide a supply of milk-producing feed for the doe that must freshen when natural green feed is wanting. This subject will be discussed in Chapter XIV.

From another point of view it is better to keep two does than one. A goat suffers more from loneliness than any other animal. With companionship she is quieter, eats better, and gives more milk.

The "Billy-goat" Problem.—The two most vexing problems that confront the owner of two or three family goats are: first, the breeding of the does; in other words, the "billy-goat" problem, and the raising of the kids. Some goat owners are fortunate enough to live near a breeding herd, where the services of a pure bred stud are easily obtained. Others are willing to go to the trouble and expense of shipping their does by express to the nearest registered buck.

Still others, having the courage of their convictions, will themselves purchase and maintain a pure bred buck for the use of their own two or three does. This is expensive, and it is a great care to maintain a buck in proper quarters and conditions, really too formidable a task to undertake for the sake of a very few does. Still worse, however, is the alternative, sometimes accepted, to breed the good doe to a scrub or grade buck merely for the sake of getting her fresh, and disregarding her possibilities as a source of improved stock.

The Kid Problem.—Akin to this problem of breeding is that of the kids. If grades, buck kids will be killed at birth, but the doe kids from good sires ought to be raised. It takes milk, however, and lots of it, to raise a kid right, and the goat is supposed to be the source of the family supply. Here again various makeshifts are attempted. Sometimes the kid gets the milk, and the family does without. Sometimes there is enough for both. Sometimes the kids are given away, or sold at a small price to a neighbor who has cow milk with which to raise them.

The Solution.—None of these solutions are especially satisfactory. The right answer to both of these vexatious problems, the breeding and the kids, lies in the community herd. This is an institution not yet established in America, but one which has for a long time been in different stages of prosperous development in Europe.

The Community Herd.—The special form of this institution which would probably find most favor in America would be a coöperative association of all the goat owners in any community. This association would purchase the kind of buck, or bucks, most suited to the needs of the group, and hand over the task of caring for the bucks and the breeding to some member that was most fitted for this responsibility. This person would, in addition, give his or her time to the keeping of registry records, to the buying and selling of stock according to the needs of the community, to the coöperative buying of feed, and finally to the raising of the kids. This last could be done very well by the use of cow milk, bought in wholesale quantities and suitably modified, thus insuring two things, the proper development of the valuable kids, and the retention of the superior goat milk for the little children of the goat owners.

If pasture areas were adjacent to such a community, it might take a further lesson from European custom by employing a community herd boy, who would each day collect the does, take them out to graze, and return them to their homes at night. This would be more profitable than staking the does individually, or stall feeding them exclusively.

All modern life tends more and more toward different forms of community effort and coöperation. No

one thing would do more for the progress of the milk goat industry and the welfare of American childhood than the widespread development of such community associations as has been suggested above. In such associations would be found the solution of many of our present problems, and the assurance to thousands of children of an abundant supply of the best milk in the world.

QUESTIONS

1. Compare the advantages of the pure bred and the grade for the average family.
2. What precautions would you use in buying a doe?
3. Name one advantage for the beginner in buying a scrub doe.
4. Why is it advantageous for a party to keep at least two goats?
5. Discuss the problems confronting the owner of two or three goats.
6. What is meant by a Community Herd?

CHAPTER VI

COMMERCIAL HERDS

Goat Dairies.—Persons who are interested in goats as a source of income, and in the establishment of a goat dairy, meet at the outset two problems that are likely to discourage one's enthusiasm. The first is the recurring problem, scarcity of stock, but determination and sufficient funds will in time get together a herd sufficiently numerous and of sufficiently high average production to insure the success of the undertaking. But the gathering together of such a herd cannot be accomplished overnight.

Problems of Distribution.—The second difficulty to be met is the Health Ordinances of the cities where a goat dairy would find its market. These ordinances, framed, of course, for cows and cow dairies, must be met in every detail of arrangement and management by the goat dairy. In the ordinances dealing with the production of milk that is to be sold unpasteurized, the regulations require a kind of construction that cannot be faced without an adequate supply of capital at the outset. The initial investment of this capital, together with the difficulty encountered in the acquiring of a herd of such numbers and quality as to produce an income proportionate

to this initial investment, presents a double problem which can only be solved, as has been said, by determination and a sufficient supply of funds.

The question of delivery is another difficulty, as the patrons of goat milk dairies are likely to be widely scattered, and the distances to be covered somewhat out of proportion to the quantity that any given herd can supply.

This difficulty of the distribution of goat milk, like the problems of the family goat, are again best met by coöperation. There is already in Los Angeles a cooperative association, formed for the purpose of marketing goat products. The success of this association, and the formation of others like it, will mean much to the future of the industry.

Financial Returns.—The various obstacles enumerated are offset by several advantages which the goat dairy possesses over the cow dairy. Once the herd is established, the goat milk is produced more economically per gallon than cow milk can be produced, it sells for a higher price (retailing for 25 cents to 40 cents a quart in the cities), it is often possible to make very profitable contracts with hospitals and sanatoriums, and, finally, the increase of the herd is a source of income considerably in excess of the income from increase in a herd of cows, since the does have two kids at a birth, as against

one calf for each cow, and the price and the demand for good stock are steady and strong.

Other Rewards.—It is only fair to say that it is the hearty testimony of everyone engaged in the goat dairy business that the substantial financial income for their labor is only part of their reward, and that the pleasure and satisfaction of watching the return to health and strength of their patrons, mostly babies and little children, gives to their chosen work a value quite out of relation to its actual financial returns.

The Range Herd.—It is a well known fact that goats do excellently on rather rough range, not only supporting themselves, but clearing and improving the land as well. This knowledge has led many people, in the poorer and abandoned farm lands of the eastern states and the rougher country of the west, to think of goats as a profitable means of utilizing their range. Some of the problems involved in handling goats under range conditions are dealt with in Chapter XIV.

Profitable Use of Waste Land.—There is a great deal to be said, however, for the range herd, as a valuable source of supply for the future milk goat. Owners of such range, often useless for other purposes, might very well make it productive of a good income, and at the same time make it contribute to the need of the country for more goats and better goats.

Foundation for the Herd.—The best use that could be made of this range land would be, not to stock it with highly developed, fine milk goats, but to collect bands of native goats, as numerous as the range would support, and obtain for breeding them the very finest possible pure bred bucks of one of the milk breeds. Such bands of native does could be obtained in Texas, and other

FIG. 19.—A range herd of native and low grade goats. A large number of these goats were culled from grade Angora herds of the Southwest.

parts of the Southwest and in Mexico, without too great difficulty. If Saanen bucks were to be used, a fine herd could be started by culling from the great herds of grade Angoras found throughout the west those does that are least Angora in type, and most promising as milkers. In every Angora herd there are many does that show evidence of fair milk yield.

Methods of Management.—Such a band, even if half wild, could be turned out on the range in the fall in the care of a herder. In the spring, when the kids come in, the little does could be collected and dehorned, and the buck kids castrated, then left with their dams, much as the kids in Angora herds are handled. When the kids were weaned, the dams could be allowed to go dry, as does of that quality would not pay for the labor and the equipment for milking. This process could be repeated another year.

The third year the half blood does of the first year would be ready for use. These does, being hornless or dehorned, more or less gentled, and of good milk blood, would now repay their owner for a regular dairy plant, and the poorer foundation stock would be gradually eliminated. The sale of the buck kids for meat would be a substantial source of income, providing the range was not too remote from a market. The surplus milk, after the kids were weaned, could find a market even at a distance in the form of cheese. But the most important source of income would be from the sale of the annual increase of the stock.

In order to establish the best possible market for his does, since the herd would probably be too far distant for inspection before purchasing, the owner would have to build up a reputation for honesty and square dealing,

and by the use of well known strains of pure bred bucks, by careful records and registrations, by photographs, and by reliable advertising, he would find that even remote distance would be no bar to creating a prompt and ready market for his stock. In the meantime, thanks to his very remoteness, and his consequently cheap land and cheap feed, he would produce his meat, cheese, and stock at a price considerably below that possible to the breeder who is nearer to cities.

It is true that the paragraphs above are offered as suggestions rather than data based on actual experiments. In inexperienced hands such an undertaking might present too many difficulties for success. But with the right combination of cheap, untillable land, available markets, and wise management, this plan for creating a dairy herd ought to offer good possibilities for success.

QUESTIONS

1. What are the obstacles in the way of founding commercial goat herds?
2. Discuss the advantages which the goat has over the cow in a commercial herd.
3. Of what use are goats on range land?
4. How would you go about founding a large commercial herd of goats?
5. Describe fully the methods of management you would use in handling and breeding up a large band of goats for milk production.

CHAPTER VII

THE MARKET FOR MILK GOAT PRODUCTS

Surplus Stock.—The most valuable product of the milk goat, whether of the single family doe or the large range herd, is, of course, the increase of young does. A good deal has been said concerning the ready market which good milk stock commands, and in the last chapter detailed suggestions were made as to the methods of marketing that are open to the range breeder in remote districts. In general the same methods will be employed by the owner of the dairy herd and the pure bred herd.

A dairy herd, in order to distribute its milk, must be reasonably near centers of population, where land and feed are correspondingly high in price. Therefore, to operate at a profit, the stock must be the very best, and will consequently command the highest prices. So that in addition to the methods employed by the remote breeder, the owner of pure bred, high producing, very valuable stock must have his animals always on exhibit, so to speak, in their own quarters, for a purchaser who is buying such animals naturally expects to see them first if possible. Such a breeder, too, must regularly exhibit his animals in live stock shows, and must be pre-

pared to offer orderly and well authenticated records for the milk yield of his does. A breeder who follows these methods—persistent and sound advertising, exhibiting, and record keeping, and who establishes a reputation for square dealing—need have no difficulty in disposing of his surplus, both the pure bred bucks and the pure bred and grade does, at very profitable prices.

Milk.—The difficulties and the advantages presented in marketing raw goat milk have already been discussed under the head " The Dairy Herd."

Cheese.—Next to the young stock and the raw milk, the most valuable product of the milk goat is cheese. Of the very expensive brands of imported cheese consumed in large quantities in the United States prior to the war, the best are made of goat milk, entirely or in part, and it has always been an accepted belief in Europe that goat milk is superior to cow milk in manufacturing the finest types of fancy cheese. The development of this industry in America is as yet scarcely begun. So great has been the demand for the milk, as such, that there has been none to spare for the manufacture of cheese except as a temporary expedient at times of occasional surplus.

As herds increase in size, especially in the more remote districts too far removed from centers of population to market the fresh milk, this side of the industry will certainly begin to receive the attention it well de-

serves. For there are great areas of our country that would admirably support herds of goats but which are worthless for other purposes. The product from such remote regions could only be marketed in the form of a cured cheese that could be readily shipped a considerable distance.

When one contemplates the temptingly high prices commanded by the foreign goat cheese in our markets, one is astonished that no great development of this side of the industry has as yet been undertaken. The chief reason for this has already been given—the demand for the fresh milk, where it can be marketed, and the fact that the more remote herds so far often consist of poorer stock, whose milk is practically all absorbed by the needs of the young kids. There is, however, another obstacle which stands in the way of cheese making as a method of marketing goat milk. This is the lack of experience in this country in the manufacturing of goat milk cheese and of information on the subject.

Skilled and experienced instructors in the science of cheese making abound in every state, all agricultural colleges have cheese making departments, and books and treatises on the subject are numerous and excellent, but nowhere can the goat man find any help for his special needs. The formulæ and data upon which our American science of cheese making rests are all concerned with

cow milk, and all experience tends to prove that they do not hold good, without considerable modification, for goat milk.

Without expert instruction and experience it is impossible to put a uniform and high class cheese on the market, and failing this assistance, the ordinary goat breeder is handicapped in his attempt to dispose thus of his milk. However, it is only a question of time, and of the availability of milk goats in large numbers, until American enterprise will have dealt with this phase of the industry successfully, and we shall expect to see the waste spaces of our mountains becoming productive and offering to our American market types of goat cheese that will supplant the imported article. One might well look to our state agricultural departments for leadership along these lines of investigation and experiment, but so far no progress seems to have been made in this direction. But as the industry develops and this need becomes more clearly apparent, no doubt it will be met by the colleges, especially if funds for the purpose can be provided, either by state appropriation or by the goat people themselves.

Formulæ for Goat Cheese.—In the meantime, some suggestions can be made which, though limited, are at least tested and trustworthy. It has been found that of all the cheese formulas in present use for cow milk the

one that applies most successfully to goat milk is that for Neuchatel. This is a form of soft cheese that commands a ready market at a profitable price. It is not too difficult, even for a novice, to turn out a delicious and uniform cheese of this type, and it does not require a very elaborate apparatus. On the other hand, since it is not a cured cheese, its keeping qualities are limited, and it would not solve the problem for the herd located in remote regions. If one is interested in the manufacture of Neuchatel cheese, information and instruction are easily obtained. The United States Department of Agriculture and the Agricultural Colleges, both of Cornell University and of the University of California, have issued very detailed and helpful bulletins on the subject, and most agricultural colleges offer occasional short courses in cheese making where instruction and experiment supplement the information of the texts.[1]

For a cured cheese, to take care of the occasional surplus of the house or dairy supply, there is a formula, which with modifications has appeared in various articles on goat milk, and which, in the following form, has been tested with a considerable degree of success and uniformity in the results.

Apparatus.—For this cheese the following apparatus

[1] Farmers' Bulletin 960, United States Department of Agriculture, "Neuchatel and Cream Cheeses." Farmers' Bulletin 166, "Cheese Making on the Farm." Circular No. 30, Cornell University, College of Agriculture, "Soft Cheeses." Bulletin No. 285, University of California, College of Agriculture, "Milch Goats in California," page 98.

is required: A cheese thermometer, a supply of cheese rennet tablets, a curd cutter, a perforated mold, or set of molds, made of dairy tin in the form of a cylinder four inches in diameter and six inches in depth, and a draining rack. For the last, it is convenient to use a piece of galvanized wire screen, one-half inch mesh, reinforced and bound around the edges with a strip of tin. This rack should be of the size necessary for the number of cheeses in the daily output. A square of fifteen inches set on a large milkpan holds conveniently four cheeses.

The process of making is as follows: use fresh sweet milk, at a temperature of 86°. Set with rennet tablet, using enough of the rennet so that the curd will coagulate properly in about one hour. It is the general experience that this requires slightly more rennet than indicated in the directions that come with the tablets. The curd is sufficiently set when, upon moving the finger through the mass, it splits with a clean edge. If soft or mushy, too little rennet has been used, and it must be left longer before cutting. When the curd is thus seen to be ready for cutting, cut through it lengthwise and crosswise with a long kitchen knife. It must then be cut horizontally. If the cheese is made in large quantities, regular curd knives would probably be used. For a small quantity a wire egg-beater will serve, or, better, a home made device of heavy, galvanized wire strung across

with fine wire, as shown in Fig. 20. The main fact to bear in mind is that the cleaner and sharper the curd is cut, the richer will be the cheese. If the curd is roughly broken or mashed in cutting, the fat escapes into the whey, and so is lost to the cheese.

When the cutting is done, the resulting cubes should

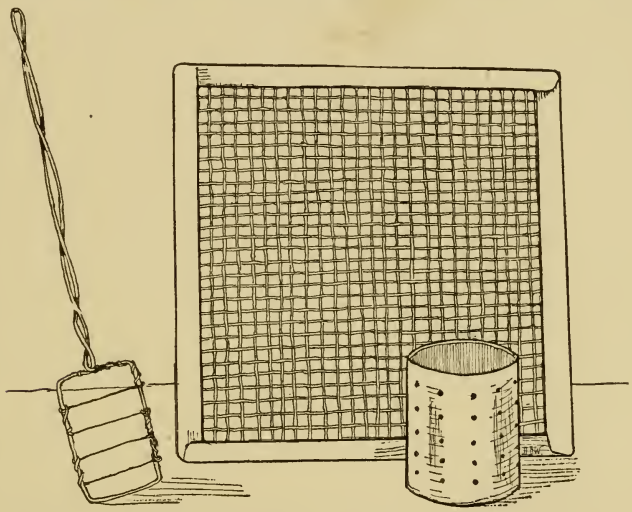


Fig. 20.—Cheese making apparatus, curd cutter, mold, draining rack.

be about one inch in size. Now stir the mass with the hand, slowly and gently, so as not to break the curds, for about five minutes. The cubes will then have shrunk considerably and the whey will have begun to rise to the surface. Pour off this separated whey and with a soup ladle dip the remaining curd and whey into the molds. These molds will be standing on the wire net-

ting, which must be covered with a piece of cheesecloth, and must be set over a milkpan or dishpan to catch the whey which rapidly drains out from the molds.

The molds are filled to the top and left for an hour or so. At that time they should be turned. The curd is left in the molds, on the drain racks, about twenty-four hours, and should be turned two or three times again. At the end of twenty-four hours, when it will have shrunk to a depth of two and one-half inches, slip the cheese out of the mold, set on another rack covered with a clean cloth, and sprinkle salt heavily over the top and edge. Next day turn and salt the other side. Keep in a cool place of even temperature and humidity for about two weeks, wiping each cheese with a damp, clean cloth as mold begins to appear. If the cloth is wet with vinegar the mold is kept under better control.

At the end of two weeks dip in melted paraffine, which will prevent further mold and preserve the proper amount of moisture in the cheese. A cheese of pure goat milk tends to become a little dry and hard in process of curing, so that the paraffining is especially useful for this type. The curing is well under way at one month, and the cheese excellent, but it is improved and mellowed by another month's curing, and should keep in good condition for six months or more.

A gallon of milk makes about one pound of cheese of

this type at a month old. It is a delicious cheese, mild and very rich, with a distinctive flavor unlike any kind of cheese from cow milk. With experience and a proper equipment and proper curing rooms so as to produce an article of uniform excellence, this cheese would probably soon command a very good market, but might not sell for as high a price as Roquefort or some of the other more highly flavored types of imported cheese. So far it seems to have been used only in caring for an occasional surplus, but even so, it has met with great appreciation and a ready local sale.

Butter.—One often hears the statement that no cream rises on goat milk. In so far as this is true, it is the result of one of the very qualities that make the milk superior in digestibility—the small size of the fat globule, and its perfect emulsion in the milk. However, the fact is that goat milk varies in this respect, sometimes yielding a very satisfactory amount of cream when set in pans, sometimes none at all, even though the same milk, when run through the tester, shows a high butter-fat content. Climatic conditions seem to have some influence in the matter, but this is not a very conclusive explanation. Whatever it is that causes this variation, in any case, if we really want the cream, or butter fat, we can get it. The separators for cow milk that are on the market can be adjusted to give excellent results

with goat milk, and if one has not enough milk to justify the use of a separator, there is another method of obtaining the cream. Set the fresh milk in shallow pans on the back of the stove, where with a steady, gentle heat it can be brought to the scalding point, indicated by a slight wrinkling of the surface. Set it at once in a cool place, and in twelve hours the cream comes off as thick and solid as from any Jersey milk.

Once obtained, the cream can be made into butter by the usual methods, resulting in a delicious product that cannot be surpassed. As a concession to our habits, however, butter color must be used, as the cream and the butter, like the milk itself, is pure white.

As a commercial product goat butter would not seem to be such a promising undertaking as goat cheese. However, certain foreigners in our cities, especially Greeks, are eager to obtain it, and the Wells Fargo paper recently carried for some time an advertisement offering $1 a pound for goat butter, to supply a demand from the more prosperous Greeks in New York City.

Goat Meat.—Probably the only circumstances under which it is ever profitable to raise the buck kids for meat would be in the case of such wild or half wild herds as we have described in Chapter VI under the "Range Herd." In all circumstances where this milk can be marketed whole or as cheese it is more profitable in this

form than converted into meat by feeding it to the kids. However, if circumstances arise where it is not practicable to milk the does and to market their milk, and the buck kids are left to run with the dams, there are certain points to bear in mind for marketing the meat. It may be said in passing that the meat of a kid or young wether is delicious—no one who has ever tasted it, properly prepared, can maintain any prejudice against it, while our foreign population regard it as the greatest delicacy.

Marketing.—In marketing the kids, then, it is best to deal directly with a group of Italians, or to sell through one of the Italian commission houses which exist in most of our larger cities, thus assuring oneself of a price as good as possible to obtain. Another point to be borne in mind: all Italians, Greeks, Portuguese and other foreigners from the Catholic countries, make a special effort to obtain for their Easter celebration a young kid. This seems to be a dim, far-off survival of the Paschal kid of the Hebrew feast. However that may be, a kid ready for eating at that time commands nearly twice the price that it does ordinarily. It must be at least three weeks old, but not more than three months, and still suckling. A twenty-five-pound kid is the size preferred. So dependable is this market that persons raising kids for meat would do well to bear it in

mind, and breed the does with reference to the Easter date of the coming year.

Where feed is plentiful and costs nothing, as on a large range, it might be profitable to carry the buck kids past the weaning age into the fall, and sell them at a weight of seventy-five to one hundred pounds. If this is contemplated, they must, of course, be castrated, an operation that is most successfully performed when the kid is about ten days old.

Hides.—There seems to be at present no profitable market for goat hides, except for the hides of the long haired Angoras. Yet the United States imports millions of goat hides annually. In our industry, as organized at present, where very few animals are raised except the milkers and the pure bred studs, there would, of course, be no great number of hides to dispose of, except from the male kids destroyed at birth. These tiny hides, if carefully handled and dressed, make a beautiful fur, and if obtained in sufficient numbers for matching can be used for very handsome muffs, neck pieces, or trimmings. Aside from these hides, the goat keeper would have ordinarily only the skins of such animals as occasionally died in the herd from accident, sickness or age.

Curing.—The hides, as soon as removed from the body, should be hung in a shady place out of the sun to dry. They should be spread evenly, without creases.

When quite dry they can be laid aside until there are enough to send to a tannery for dressing.

If the dressing is to be done at home, full and very useful directions are to be found for this process in the "Goat World," March, 1917, p. 7, "The Tanning of a Goat Skin for Home Use and Ornament," C. W. Hibbard.

Fertilizer.—One more product of goats must not be overlooked—the manure, which is no small item in the account to their credit. It has the highest value of any fertilizer known, and if the premises are so arranged that it can be kept reasonably free from dirt and litter, it commands very high prices from gardeners and orchardists who are working on an intensive scale.

QUESTIONS

1. Name the various outlets for milk goat products.
2. Give several helpful suggestions which a breeder might follow in disposing of surplus stock.
3. Discuss fully the outlook for the goat cheese industry.
4. In what ways can cream be obtained from goat milk?
5. How great is the demand for goat butter?
6. When would it pay one to use the goat to produce meat?
7. To what use can the goat hides be put?
8. Of what value is goat manure?

CHAPTER VIII

GOAT BREEDING AS A VOCATION FOR WOMEN

Special Fitness of Women for This Work.—In looking over the field of the milk goat industry, one is impressed with the number of women who are engaged in this work, and by the evident leadership which many have achieved. Even before the first importations it was a woman, Mrs. Edward Roby, of Chicago, who was the first to awaken interest and initiate effort in behalf of the milk goat. Although she had only the common American goat to work with, she accomplished a great deal, by careful selection and breeding, toward building up a herd of profitable milkers. But she accomplished more by arousing the interest which led to the importation of pure bred milk stock and the consequent rapid development of the industry. Since those early importations it has been in the main women who have had the vision to foresee the possibilities of the milk goat, and the courage to devote themselves to pioneer work in this field.

Reasons.—Nor is the reason far to seek. For the development of the milk goat has for its fundamental and always essential motive the desire to supply to little

children a food so peculiarly valuable to them. What concerns the welfare of childhood must always be of primary concern to women, and it is exactly this concern

FIG. 21.—Miss Jane White, Los Angeles, a pioneer woman goat breeder. Through the high quality of the herd she has built up, and through her writings and her enthusiastic personal leadership, Miss White has made a most valuable contribution to the industry.

which explains the important part that women have taken in the development of the milk goat in America.

Besides this fundamental interest of women in goats these little animals make an appeal on other grounds. Their small size and the consequent ease of handling them, their cleanliness and fastidious habits, their grace

and beauty, and finally their intelligent and affectionate dispositions, offer an irresistible charm, so that it is not surprising that women have adopted this work in considerable numbers and with conspicuous success.

Conditions Essential to Success.—Certain personal qualifications, however, are essential to this success, and first of all one would name physical strength and endurance. Many women of delicate or impaired health have turned to goat breeding as an occupation that might offer them restoration and at the same time a livelihood. Of the benefits arising from this work there is not the slightest doubt. The outdoor life, the keen interest aroused by the lovable, small creatures, no less than the use of their milk—these things have in many cases meant all the difference between the despair of shattered health and the delight of renewed vigor and normal physical condition. But in such cases the work should be undertaken with moderation and on a small scale, and only a woman of steady, dependable health and considerable actual muscular strength and endurance can hope to carry on the goat business on a scale large enough to produce a profitable livelihood.

Physical Endurance.—One must be able to work hard and steadily during most of the year for ten hours a day, and in the kidding season much longer hours are often necessary. One must be able to put through a

long, hard day's work, drop into bed for an hour or so, be roused by the sudden need of some sick animal, and spend the rest of the night in her care, and then take up the next day's schedule with unabated energy. For such crises are recurrent in any large group of animals, and one must be able to meet them. Besides strength, the goat breeder must have the surgeon's steady hand, something of a physician's instinct for diagnosis, and a considerable knowledge of the remedies with which disease and sickness are to be fought. She must have endless patience and self control, courage to face losses and disappointments and the vision and faith to carry on in the face of them.

Love of Animals.—But above all she must have that inborn quality which cannot be attained and for which there seems to be no name, an instinctive understanding of animals, of their needs and of their possibilities, a quality akin to the creative genius of the poet or artist, a gift that is indeed creative, and builds from its living materials the homogeneous beauty of the herd. Without this gift all the labor of the daily task is drudgery only, and success will never come as its reward—with this gift almost any obstacle will be surmounted, the drudgery will be illuminated with delight and crowned with success. For this peculiar quality no better name seems offered by our language than our homely phrase

" a way with animals." Lucky the goat keeper who has " a way! "

Business Ability.—So much for the qualifications necessary to a breeder on the creative side of her work. The animals once raised must be sold, and so must their product. This means that the goat woman must also be a business woman, trained in the routine of office work—accounts, records, files, the inevitable card catalogue—all necessary to deal with the details of handling registered high priced stock. She must be a good saleswoman, with a gift for writing advertisements and good selling letters, a capable judge of human nature—in short, she must be a successful merchant as well as a successful breeder.

Is this a formidable list of qualifications? By no means—granted good health, and " a way with animals," the average American woman will present or achieve the rest of the list, justifying her choice of a lifework by the substantial contribution she makes to the economic wealth of the nation and to the welfare of the race.

Capital.—Aside from the personal qualifications, there are other conditions essential to success, which must be considered before one would turn to goat breeding as a means of livelihood. Capital to buy stock, land, buildings and equipment, and a location that will provide a suitable market, these are the two main factors in

the establishment and prosperous development of the milk goat business.

Starting Without Capital.—To the young woman who loves animals and the outdoor life but who has no capital to establish a goat breeding business, there are several sides of the industry that might make an appeal, and that would be within the scope of her limitations. If, for instance, there were in the possession of her family, or otherwise available, any areas of waste brush land, she might at a small outlay of cash use them in making a start by buying a few native does and a good milk buck, and handling these animals as has been suggested under the discussion of the "Range Herd," so creating for herself the nucleus of a productive herd at a small outlay. She would, of course, have no income from such a venture for some time, and it would be a venture that would appeal most to the girl whose family wishes her to remain at home, and who has no immediate necessity for self-support, but who, with characteristic American initiative, desires some work that is distinctly her own, and that is, at the same time, essentially useful and valuable.

Other young women, in homes nearer the centers of civilization, where space is limited, could make a similar beginning for a small outlay by buying a couple of grade does, as good as could be afforded, and, by breed-

ing to the best available bucks, increase the value of her stock, rather than their numbers, so gaining experience and the nucleus of a herd without much capital.

Apprenticeship.—For the girl who must at once earn her living, who has no capital, and who, nevertheless, is warmly attracted to this field of work, there is still another possibility open. Let her first serve an apprenticeship as an assistant with some established and successful goat breeder. Women helpers are on the whole preferred to men for this work, and the right kind of a young woman would find no difficulty in obtaining a position in which her support would be insured while she gained experience and knowledge of the business. This gained, let her take in hand in some community where the opportunity offered, the organization of such a community herd as has been suggested in Chapter V. If she were successful in that undertaking, and her services were engaged for the management of the breeding, buying, selling and kid raising for the association, she would thus be able, although without capital of her own, to devote herself to the work of her choice, to support herself, and to contribute to the prosperity of the community and the health of its children.

In reviewing the whole field, it would appear that the milk goat had offered to the American woman one of her finest opportunities to develop those qualities

which are the most characteristically American—initiative, courage, and devotion to the welfare of humanity.

QUESTIONS

1. What factors have made women successful in goat raising?
2. Name the qualifications which a woman must possess in order to be a successful goat breeder.
3. How can a start be made in the goat industry without capital?

CHAPTER IX

THE CHOICE OF A BREED

General Considerations.—In deciding upon a choice of one of the three breeds of milk goats one may quite safely be guided by chance, by convenience, or by personal preference. In other words, all three breeds are so good that it is impossible to make a mistake in choosing any of them. Safest of all is the choice dictated by one's preference, for success in handling goats is so closely dependent upon one's affection for them that the point of first importance in starting the business is to be sure you heartily like the breed you select. Nevertheless, there are certain practical considerations that may have to be weighed. These can best be presented following a brief description of each of the breeds.

The Anglo-Nubian.—This breed was originally established by crossing bucks of Egyptian or Oriental origin upon the native does of England. The cross bred animal thus obtained inherited the vigor and constitution of the dam, permitting it to thrive in the climate of England, and, with some modifications, the peculiar type and the productivity of the imported sires. The breed most used in the creation of the Anglo-Nubian seems to have been the Nubian goats of Northern Africa. An inter-

esting account of this breed is found in Bulletin 68, United States Department of Agriculture, page 66. The cross once established, it has been maintained as a separate breed, and presents a type that is measurably fixed and uniform.

Characteristics.—It is a relatively large goat, long limbed and rangy. There is no fixed color, dark red and black goats being perhaps the most usual and the handsomest of this breed, although spotted animals, showing a pattern of white, red, tan and black, are probably the most popular, and are certainly beautiful and striking in appearance. The peculiarity that characterizes this breed is the ears, which are wide, flat and pendulous, often very long, hanging straight down beyond the end of the nose. The facial line is distinctly arched. The majority of the animals of this breed are hornless. If they are not born so, it is comparatively easy to destroy the horn bud in the young kid, as the horns of the Anglo-Nubian, even when fully developed, are small and light. The coat, both of the doe and the buck, is short and glossy. The pure bred Anglo-Nubians have a bearing of grace and distinction, which with their shining coats and rich coloring make them an animal of captivating beauty. They are quiet, gentle and affectionate in disposition.

In spite of the infusion of native English blood in

FIG. 22.—Banzai Ben Hur, a handsome black Anglo-Nubian buck. (Courtesy Widemann Goat Milk Co., San Francisco, Calif.)

FIG. 23.—Sadberge Plover, imported Anglo-Nubian doe, owned by A. French, North Vancouver, B. C., Canada. (Courtesy of the *Goat World*)

this breed, they still show in our range of climate some of the sensitiveness to cold and exposure that one would expect from their southern origin. With good housing and care they do well, but if exposed to cold or wet they are likely to contract pneumonia, and the does, if pregnant, are likely to abort their kids.

Breeding Season.—The Anglo-Nubian is said to

FIG. 24.—Typical Anglo-Nubian heads.

have a less limited breeding season than the Swiss goats, a very great advantage, so far as it holds true, for goat dairy practice, since one of the problems of the goat dairy is the great difficulty of having does come fresh late enough in the year to insure a more uniform supply of milk.

The Milk.—Another point of advantage in this breed is the short, smooth coat, which makes for cleanliness in milking. The udders are almost always of an excellent

type, being rather deeply divided with long teats easily grasped. The milk is very rich, richer than the best Jersey cow milk, surpassing the Swiss breeds in this respect. The best records of daily and annual yields do not show such a high average as those established by does of the Swiss breeds, although there are many exceptionally heavy milkers found among the pure bred and grade Anglo-Nubians.

Fig. 25.—Anglo-Nubian head.

The Swiss Breeds. —*Saanens and Toggenburgs.*—The Saanens and Toggenburg goats are so closely allied in origin and type that it is convenient to describe them as one group. Both breeds were created by a process of selection from the common Alpine race, and both were selected for the same attributes except in point of color. The Swiss breeds are like the Anglo-Nubians, rather rangy, lean animals—a characteristic of all good dairy types—but they have rather less length of limb than the Nubians.

The Saanen is sometimes said to be a larger goat than the Toggenburg, but it would appear that in our

American conditions this difference had been minimized, and the differences in size are rather between individuals than between these two breeds. The Saanen is pure white. The Toggenburg is brown, ranging from a light fawn color to a rather dark brown, marked by a fixed,

Fig. 26.—Spotted Anglo-Nubians. (Owned by Mrs. Arthur Wight, Santa Cruz, Calif.)

definite, and very charming pattern of white. The ears are white, with a dark spot in the center. There are two clear white stripes down either side the face from above the eyes to the muzzle, which is also white. The legs are white on the inside and entirely white from the knees and hocks to the hoofs. There is a triangle of white on either side the tail. This demure, brown uniform, with its at-

tractive trimmings, gives a herd of well bred Toggenburgs an appearance of irresistible charm. There is a legend that this breed originated from a cross between the wild chamois of the Alps and the domestic goat. However that may be, there is about the young Toggen-

Fig. 27.—A young Saanen, Bralef Hernia, at 16 months of age, showing a splendid development of the udder. (Owned by L. A. Bridinger, Santa Rosa, Calif.)

burg a bearing of free, deer like grace, a poise that might well link her with the wild beauty of the chamois. It is this poise, so suggestive of the untamed freedom of mountain creatures, coupled with her gentle, loving friendliness toward human beings, that offers one of the most winning surprises of the animal world. The outstanding beauty of the Saanen is her purity of color, and nothing

could be lovelier than a group of these clean limbed, snowy creatures, set in a background of fresh, green grass and trees.

Characteristics of Swiss Breeds.—The ears of the Swiss breeds are slender, rather small, and stand erect

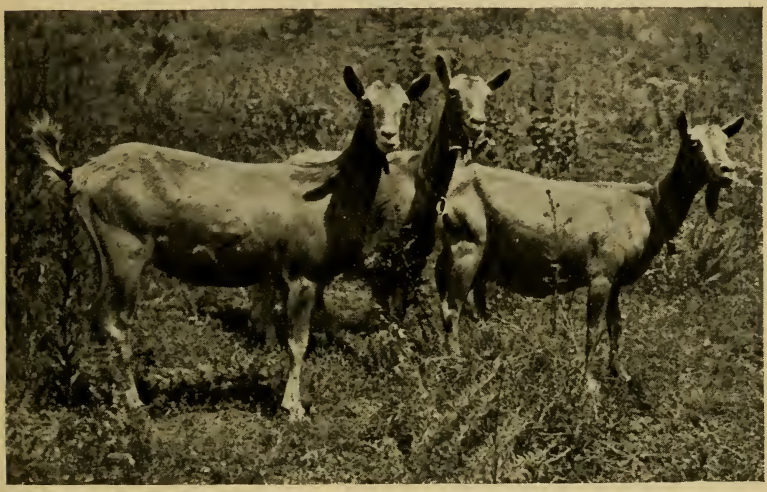


FIG. 28.—A group of pure bred Toggenburgs, showing the deer like poise characteristic of this breed.

from the head. The facial line is straight or slightly concave. Both breeds are practically hornless, though both occasionally present individuals who revert to the common horned prototype of the race. The coat varies, in many individuals it is as short and glossy as that of the Anglo-Nubian. In others it is rather long and shaggy. Long hair predominates in the bucks. Al-

though one sees bucks of the Swiss breeds with short, smooth coats, they are the exception rather than the rule.

Milk Yield.—The typical udder of a Swiss doe is one that is carried high, well attached, with teats distinct from the udder itself, and large enough for ease in milking. The milk yield is heavy and the butter fat ranges characteristically from 3.5 per cent. to 5 per cent. Both breeds have hardy constitutions, and have shown wonderful adaptability to the varieties of climite presented in their American homes. They have done well wherever they have gone.

FIG. 29.—Las Cabritas Loretta, 1156, Advanced Registry, 13, yield 12 lbs a day. A typical Toggenburg udder.

Practical Basis for Choice.—Now what are the practical considerations that would influence one's choice of these three breeds? If one is choosing a family goat, the most important

consideration is, "What is the nearest good pure bred buck to which I can breed my doe?" Other things being equal, the answer to this question should be the determining factor. If the herd to be established must meet range conditions, the more rugged Swiss breeds will probably be the more successful. If the

FIG. 30.—Saanens on the hillside. (Courtesy L. A. Bridinger, Santa Rosa, Calif.)

herd is to consist of a pure bred buck and native does, the choice would be determined somewhat by the character of the does. If white does were available in any number, a Saanen buck should be the choice. It is useless, from the point of view of type, to cross a Toggenburg buck with a white doe, as the white seems to be a very persistent characteristic, which many generations

will fail to eliminate. If does of a fairly even brown or tan coloring can be obtained, the first cross will usually show the Toggenburg markings, and the type will be rapidly established. If only vari-colored does of all descriptions can be obtained, a Nubian buck is the best recourse, as in breeding to that type color plays no important part. Moreover, a Nubian buck will more quickly impress a herd founded on common goats with the " points " of his breed, and with a generally improved appearance of size and type than will a Swiss buck. The grade offspring of the Swiss bucks, however, seem to approach the high milk yield of their breed more rapidly than do Nubian grades.

In spite of these minor practical considerations, we return to the statement made at the beginning of this chapter, that all the breeds are so good that one cannot make a mistake in choosing. Personal preference is the safest guide, and here, too, so valuable and so appealing are the little friendly animals of all the breeds, one is tempted to conclude, in the paraphrased words of the popular song:

" Any little goat that's a *nice* little goat
Is the right little goat for me! "

QUESTIONS

1. How did the Anglo-Nubian originate?
2. Describe the appearance of a typical Anglo-Nubian.
3. What advantages has the Anglo-Nubian over the Swiss breeds?
4. In what ways do the Saanen resemble the Toggenburg? What are the points of difference?
5. What are the practical considerations that would influence one's choice of a breed?

CHAPTER X

MOTHER NATURE'S GOAT

Fallacy of "Natural" Methods.—In this country, where the milk goat industry is new, one frequently hears, in discussions of the care and management of milk goats, the phrases, "A goat *naturally* does so and so," or, "Nature intended the goat to be thus or otherwise." No fallacy could be more harmful to the development of the dairy goat than the belief that we can look to Nature for guidance in her care. This is equally true of the dairy cow. Nature intended the milk of all the mammals for the use of their offspring alone. To remove the offspring, to increase and prolong the flow of milk for other purposes, this is perhaps of all imaginable proceedings the most unnatural and artificial, and the dairy cow or goat thus developed is correspondingly the least natural, and the most artificial, and the most dependent upon her creator, man, of all the animals in the world. The fallacies that have arisen from this "nature" talk can perhaps be most forcibly illustrated by giving an imaginary chapter from the life of a goat whose "care and management" is wholly in the hands of Mother Nature.

If it is objected that we cannot really know the complete facts concerning the habits of wild goats, we can reply that we do know something, from the studies made, for instance, of the Rocky Mountain goat. We have also a much more complete opportunity for the study of the natural habits of goats in the great bands that roam the Southwest and Mexico. These animals, raised for their meat and hides, have only the most superficial attention from herdsmen who often are not far removed from a " state of nature " themselves. The goats, whatever their origin, are wild to all intents and purposes, and have developed the instincts and habits which belong to the feral state.

In the light of such data as we are thus able to collect, let us listen to a chapter from the life history of a little goat, as it might be presented by old Dame Nature herself.

Life History of a Wild Goat.*—" In the first warm, sunny days of spring, somewhere near the vernal equinox, the mother doe grows restless and wanders away from the herd. In the thick brush she hunts a secret place, and paws and noses the fern and grass into a nest-like bed. Here presently her kids are born, a strong, big doe, a smaller and less vigorous buck. The mother licks them both impartially. Long before she is dry the

* Reproduced from the Goat World, April, 1917, page 3.

little doe is on her feet. Swaying, staggering, crying shrilly, she starts on her tour of exploration, butting with such vigor as she goes that every second step she knocks herself sprawling on the fern, only to sway again to her uncertain footing and the pursuit of her goal. At last she triumphs. With infinite courage and patience she makes connections, and the first wonderful swig of milk is accomplished. With many a butt, and consequent tumble, and determined renewal, she makes a meal of it finally, curls up in the sun, and, dry and warm and full, she goes to sleep.

"What of little brother all this time? His mother has been busily drying him, and he has lain crying feebly and squirming about during the process. Now he, too, essays his feet, sways and totters, and starts in his turn the hunt for dinner. But by this time the sun is high and mother doe has had not a mouthful to eat this day. She stretches herself, yawns, and with a last sniff at both babies, she leaves the nest to find some dinner for herself. Little brother wails hungrily, stumbles over his sleeping sister, and cuddles down, forgetting in sleep his empty stomach. In an hour or so the mother is back. The doe kid, strengthened by her sleep and her well digested dinner, is instantly on her feet, making straight for her mother's bag, where once more she sucks away until she is as full as she can hold. But the little buck has his

journey of discovery all before him. Urged by his sharp hunger, he manfully begins the job, only to find, when success at last crowns his weary efforts, that there is not much left for him!

"Now I know very well," says Mother Nature, "that if my doe had been 'kept up' a week or so before she kidded, and fed all she wanted to eat, and if she had had a nice warm mash that morning, and an armful of alfalfa hay, she probably would have had plenty of milk for both those kids. And if someone had been by to lend a hand to little brother, who really was a perfectly good little buck, he would have got his fair share on time, and the sequel might have been different. But I did the best I could.

"For nearly a week the babies remained in the hidden nest, while the mother fed near at hand and returned at frequent intervals to see that all was well. In the rush for her bag that greeted her every appearance, the little doe kid never lost the lead she had gained over her brother in that first feeding. The buck, to be sure, learned speed and 'punch' and did his manful best to get and keep his side of the bag, but one side was never quite enough for little sister, and somehow she managed nearly always to rob a share from the other side, too.

"Soon the herd begins to move again, slowly at first, for there are many does with little kids, but even the

good spring feed is wearing thin, and all must eat. Our doe joins the band, and her twins, following the band, rollicking and romping with the other kids, nibbling a little here and there at the tender grass and shoots, find themselves two very weary babies when night falls, and they cuddle up under the lee of their mother's back. But little sister, always a wee bit stouter and fuller of milk than the buck, thrives and grows hardy under the strain of the long day's march. One day the feed the herd encounters is sparser than usual. They travel farther. The kids cease their romping and follow wearily. In the late afternoon, when all halt to browse on a promising hillside, our little kids, foredone with the long travel, curl up in the sun and go to sleep. Presently the sun sets. The herd moves. Little sister, refreshed and alert, is awakened by the chill and the moving goats, springs to her feet and scampers in search of her mother, who answers her shrill cries until they find each other and follow on with the band. But little brother, whose stomach was not so full that day, nor his legs so steady, sleeps on in exhausted weariness. When at last he wakens in the darkness, his little wailing cry is answered by a long drawn howl, and a dark, silent shape comes swiftly through the brush.

" The old doe and her kid live on through the sunny spring days, and each day the little one spends less time

in romping, and more time in hunting the best bites of grass and brush. Not that she loses her interest in her mother's bag. Far from it! But now the grass is not quite so green, the herd moves farther each day—drier feed and longer travel show their effects on mother doe's milk. It does not come fast enough for the hungry, impatient kid; she butts harder, and mother doe lifts high her hind legs and walks away. The rough little husky kid turns philosophically to grazing again, and fills the empty chinks, and before she is three months old, her mother has weaned her in self-defense, and she is doing very well 'on her own.' Now I know," says Mother Nature, "that I could have made a lot better goat out of that kid if I could have had a bottle and could have given her milk, all she wanted, a month or so longer. But I did the best I could.

"Spring long since gone, summer followed, and autumn is here. With the passing of the green spring grass all the does have gone dry, and their udders have shrunk from sight. But the brush is abundant, which goats love, and while it will not supply them with milk, it keeps them in good condition. A new uneasiness stirs in the herd, manifesting itself first among the bucks. They eye each other askance, sometimes two or more of them withdraw from the herd, and the still warm day will be filled with the sound of their grunting cries and

the clash of their great horns as they hurl themselves upon each other. Not infrequently after such an all day combat, when darkness falls and the herd moves, those shapes that hang always upon the flanks of the band close in behind them, and their joyous yelps proclaim, 'The whole pack feasts to-night.'

"In another week or two the uneasiness spreads to the does, and one by one they answer the call of the long bearded king of the herd."

What of the little doe kid—does she, too, answer the call, this first autumn of her life? At this point Mother Nature gives us no sure clew, but observation would lead us to believe that at seven months old our little doe takes up her task of motherhood. And what of the buck that calls her—who looks up their pedigree, and says yea or nay to the mating according to the degree of their consanguinity? Well, Mother Nature doesn't. "I wish I could," says she, "I think it would be a fine idea. But I have done the best I could. From the first moment of the lives of each of these goats I have put both of them through every test I could devise. The doe lived because she was just a little quicker and stronger than her brother. The buck has met every hardship that she has had to meet, and besides has tried himself against all the other bucks that passed my early tests, and he has come off the victor over all of them. Suppose he is the

sire of the little doe, or her brother? In hardihood, endurance, strength, courage and alertness neither of them can be surpassed. How can I go astray in mating them?"

Not a Dairy Animal.—"And so," says Mother Nature, "here is my little goat. I have done the best I could for her. If you will carefully husband the good gifts I have given her, and add to them out of your superior resources, she will prove the greatest treasure I have given mankind out of the storehouse of my mountain meadows and upland plains. I know that she is not a milk goat, my little wild doe, but she has it in her to become the most wonderful little milk factory in all the world. It's up to you."

The story thus presented to us will be found to have a very pertinent bearing upon the problems to be discussed in the succeeding chapters on the buck, the kids, and the does. As we discuss in detail the various phases of the care of our dairy goats, we shall have many occasions to refer to this chapter taken from the annals of Mother Nature.

Points of Disagreement Among Breeders.—Before taking up this detailed discussion, it may be well to state that there are many matters involved in the care of goats that are still subjects of disagreement even among the best breeders. The theory and practice of management in one herd may differ widely from that in another, al-

though both herds may show equally good results. Some points of disagreement that may be mentioned are: methods of feeding kids, age for weaning, age for breeding, age for service from bucks, rations for milking does, etc. In all matters where opinion differs it has been the purpose of this book to present the most conservative and the most carefully tested instructions for the management of the animals. Thus a beginner with no experience whatever can probably follow with entire safety the suggestions offered, while the experienced breeder, whose judgment is trained by long observation of his animals, may follow other methods with equal safety and success.

QUESTIONS

1. Name several reasons why we cannot look to nature to care for the modern milk goat.
2. Show why nature's method in raising twins might fail.
3. Show why nature's methods are not the best for raising high producing does.

CHAPTER XI

THE HALF OF THE HERD—THE BUCK

The Choice of a Buck.—" The sire is the half of the herd." In the literature of stock breeding no phrase has become so well worn as this by constant repetition. And if it is true for stock breeding in general, it certainly applies with special force to the milk goat herd. For at the present stage of our industry the pure bred herd of any size is practically unknown, and the hopes for our future are for the most part centered in the herds that are being patiently built up from our native stock and pure bred sires. In these herds there can be no question of the truth and significance of this ancient dictum. If we feel convinced of its truth, the greater will be our care in choosing the individual upon whom our fortunes thus depend.

Breed Characteristics.—Some of the points that will influence our choice of a buck have been discussed in the chapter on the breeds. There are other points, traditionally associated with the breed, that may appear to demand attention in making a decision. One is the statement frequently encountered that the Anglo-Nubian buck has no odor, makes no noise, and is ready to give

FIG. 31.—A range herd, largely of white native does, for which Saanen bucks were successfully used in grading up. (Courtesy Widemann Milk Goat Co.)

service in any month of the year—in these respects being far superior to the bucks of the Swiss breeds. To a considerable degree this statement would appear to be based upon the description of the Nubian goat, referred to in Chapter IX, found in Bulletin 68 of the United States Department of Agriculture. In this description the following sentences appear: " The ' goat odor ' so common in the males of other breeds is entirely wanting in this one." " The Nubian is the most peaceful and gentle of the goat family." No statement is made in this description of the long breeding season of the Nubian, but it is reasonable to suppose that in the mild even climate of its native home, all year round breeding would become a characteristic of the race. The limited breeding season is a provision of Nature in order that the goats of more northern climates may drop their young in the season most suitable for their survival.

We have said that the claims made for the Anglo-Nubian breed in the United States rested in part on this account of the Nubian breed. It rests also in part upon the enthusiastic confirmation offered by many breeders of these Nubian traits as characterizing our Anglo-Nubians as well. On the other hand, we find well supported denials of these claims, offering instances of Anglo-Nubian bucks who were extremely dirty, and smelly, and noisy, and who had their " off-season " as well as the Swiss breeds. The explanation of these con-

flicting beliefs is probably quite simple. The native English buck, by all accounts, is guilty of the worst traits that characterize any buck. Strongly as the Nubian infusion has influenced the cross bred Anglo-Nubian, still some traits of both breeds survive, in varying degrees in individual animals. Hence the conflict of opinion. Some people have been lucky enough to own quiet, clean, and fairly odorless Anglo-Nubian bucks. Others have found their Anglo-Nubian bucks noisy and smelly. The fact is that these traits really vary more between individual animals than between the breeds as a whole. The short, smooth coat of the Anglo-Nubian buck and his small beard carry less accumulation of filth than the shaggy coat and immense beard of the Swiss male. This handicap is readily overcome by the use of clippers and scissors, in the early part of the rutting season. In other ways, too, the unpleasant habits of bucks are influenced more by proper care and management than by breed, as will be shown in later paragraphs.

The sum of this long digression is—choose your buck on the basis of his own individual traits, and not upon any traditional claim for certain breed traits.

Individual Appearance.—To pass on, then, to the important individual traits—first of all look for every detail in a buck that would indicate a high state of vitality and vigor. This is of all things the most important in a

buck. It is of all things the most difficult to describe, and at the same time the easiest to recognize. The bearing and carriage of the animal, the condition of the coat, the look of the eyes—all these are guides that cannot lead one astray. Except that it must be remembered a buck in the midst of the rutting season is with the best of

FIG. 32.—Indigo Red, 1071, good Anglo-Nubian type. (Courtesy of Arthur Wight, Santa Cruz, Calif.)

care at his worst in appearance. For this reason it is advisable, if possible, to make a choice during the early summer months, when the bucks are at rest, and have completed the annual renewal of their coats.

For the other details, the beginner is advised before choosing his buck to make a careful study of the Breed Standards, reprinted in Appendix B.

If the buck to be chosen is a kid, say in the autumn

of his first year, at six months old he should stand twenty-five to twenty-eight inches at the withers and weigh eighty to ninety pounds. He should not be fat, but smooth, well fleshed and evenly developed. In other

Fig. 33.—Las Cabritas Don Benjannine, 929. Short haired Toggenburg buck.

respects he should be judged by the same standards as the mature buck.

Milk Inheritance.—So much for the individual himself. A buck that satisfies all these demands has even then met only the lesser half of the requirements we must ask of him. For after all, while we want type, and must have vigor and constitution in our herd, the first and

great question is, "Will he bring us an increased milk yield in his daughters?" This question can only be answered by the records of the does of his family. Many purchasers seem to care only that a buck be the son of some doe who has established an outstanding record yield

FIG. 34.—Typical head of a Toggenburg buck.

of milk. While such a buck is very desirable, it is probably of even greater importance that he should come from a family all of whose records show a high average of excellence—not only his dam, but his granddams on both sides, his dam's sisters, his own sisters, and his "nieces." Most valuable of all, of course, is the buck whose own daughters have proved themselves heavy pro-

ducers. Such an animal is almost without price. But, of course, one must wait five or six years to establish the reputation of a buck on the basis of his daughters' records, and, in the meantime, young bucks must be bought and sold on the records of their families, as noted above. These records would be presented to the intending purchaser by the owner of the buck in the form of a pedigree. On this pedigree the milk record of each doe of the line is indicated, together with any special distinction she may have won as a producer, such as Advanced Registry, or winnings in competitive milking tests.

In this connection another point may be mentioned. A purchaser should not be too much influenced in the choice of a buck by the fact that he may have been a conspicuous winner in the show ring. Valuable as such successes may be in indicating individual excellence, they must not blind one to the first and most important quality in a sire, his ability to transmit productive capacity. Only the records of his family can be accepted as an indication of this ability. In short, the beginner must never allow himself to be carried away by the excellence of the buck himself—he must demand milk records, and he must, to a very great extent, be influenced by these records in his choice.

Systems of Breeding.—Another point that must be considered when purchasing a buck for a pure bred or

high grade herd is, " How closely related may he be to the does of my herd? "

In discussing this subject, it will be convenient to start with a definition of the terms usually employed to describe the different systems of breeding—cross breeding, out breeding, line breeding, and inbreeding. Cross breeding is the mating of two animals of distinctly different breeds, to produce a new combination of characteristics. Out breeding is the mating of two animals, both belonging to the same distinct type or breed, but whose individual families are not related in blood. Line breeding is commonly described as the mating of two individuals both sprung from the same line but whose common inheritance is less than 50 per cent. of the blood of each. A granddaughter bred to her grandsire, a doe to her grandson, a doe to her dam's half brother, would be instances of line breeding. It results in the intensifying of the blood of one of the lines in an individual's inheritance. Inbreeding is the mating of two animals whose common inheritance, from one or both sides, amounts to 50 per cent. or more of the blood of each. It results in intensifying some line or some combination of blood lines which has proved successful.

It is not within the scope of a book of this sort to enter into a discussion of this highly technical and complicated subject. So interwoven is it, however, with

many of the practical aspects of goat keeping that space must be taken at least to present a few of the arguments for and against these various systems.

Cross Breeding.—If one is dealing with pure bred or high grade animals of any given breed, there is very little to recommend in cross breeding and much to be said against it. The object of cross breeding is to create a new type better than any existing type. Such an undertaking requires time and means, and involves many disappointments. It requires, above all, scientific knowledge and long experience with the working of the laws of inheritance. Cross breeding, then, is a game for the few. The only practical aspects that it presents are two: first, when there is no buck of one's breed available so good as some buck of another breed that is at hand, then it might be advisable, rather than to use an inferior animal. The second practical employment of cross breeding is in the case of a herd of straight native does, bred to a pure buck of any of the three types. This, of course, is cross breeding. After one has obtained a number of half blood does from this cross, it would be folly to breed them to a pure buck of another type than their own sire. Such a proceeding only scatters the improvement already made, while continued mating to superior bucks of their sire's breed rapidly strengthens and establishes the best characteristics of that breed in the offspring. To

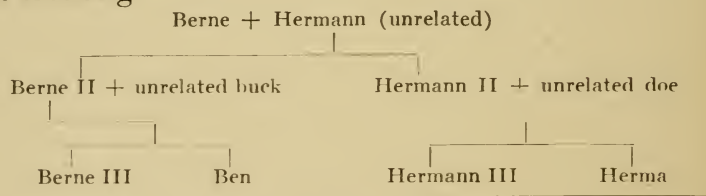
sum up: so excellent are the breeds already existing that no one, especially an amateur, can hope to improve them to any great extent by cross breeding, but by a careful selection of the best within any given breed, one will make a rapid and dependable advance.

There is another very practical consideration against cross breeding. The American public characteristically prefers a pure bred animal with its formal pure bred registry papers. If buying a grade they prefer it to be as high a grade as they can obtain, graded up consistently from one type. For example, grading up from native stock by the use of three successive Saanen bucks will give one in the third generation a registered seven-eighths doe who will probably be a very creditable representative of that breed. If, however, one has used first a Saanen buck, then for his offspring a Toggenburg buck, and again for *his* offspring an Anglo-Nubian buck, we will have in the third generation an animal that can be registered as a half blood only, and that will show an amazing combination of color and type, although, to be sure, as a producer she may have made very creditable progress. Desirable and important as this last point is, the cross bred, many colored doe will not sell for more than half the price of the straight bred, seven-eighths Saanen. From the point of view of a goat breeder who is trying to make his living, this fact must be kept steadily in mind.

Out Breeding.—For the beginner this is by all means the safest system of breeding to recommend. If the successive bucks are wisely chosen steady progress will result, and no dangers are involved.

Line Breeding and Inbreeding.—These two systems are most conveniently discussed together. Both are intended to result in unifying the type of any given herd and strengthening its desirable characteristics. They are, when successfully used, the short cut to outstanding excellence. They are, when unskillfully used, the short cut to overwhelming disaster.

Out breeding



Inbreeding to strengthen a combination

Berne III + Hermann III
Herma + Ben
Berne II + Hermann III
or
Berne II + Hermann II

Line breeding and inbreeding to strengthen one line

Berne + Hermann II (dam's line), inbreeding
or
Berne + Hermann
Berne II + Hermann (sire's line), inbreeding
Berne III + Hermann, line breeding
Herma + Hermann, line breeding

Chart to illustrate the different systems of breeding.

The methods of line- and inbreeding may be best illustrated by example: suppose in founding a herd a man were to use a buck, Hermann, and, among others, an unrelated doe, Berne, repeating this mating four or five successive years. He notes that of all his young stock, the best are those from this Berne-Hermann combination. In the meantime, he will have used other outbred bucks. He will have at hand Berne II and Hermann II from the original mating. He will have Berne III and Ben from the mating of Berne II and an unrelated buck. He will have Hermann III and Herma from Hermann II and an unrelated doe. Now, noting the superiority of the Berne-Hermann offspring, he may decide to try inbreeding, believing this superiority had resulted from a specially happy *combination* of qualities of those *two* animals. He will then try to fix that *combination* by mating Berne and Hermann, Berne III and Hermann III, Herma and Ben, Berne II and Hermann III. If he is absolutely convinced of the superiority of the Berne-Hermann combination, he may even have the nerve to mate Berne II and Hermann II, full brother and sister.

If his judgment was right, he will strengthen and establish in his herd the type represented by the Berne-Hermann combination, and his herd will rapidly rise to fame and affluence. If, however, there was some unsus-

pected weakness in this combination, that lay quiescent as long as he practiced out breeding, this weakness, no less than the good qualities, would be alarmingly apparent in the offspring, and the herd would head straight for disaster as the result of this experiment in inbreeding.

Examples.—Suppose the same man, noting the superiority of Berne's kids, whether she were bred to Hermann or another buck, should decide that they owed their superior qualities to Berne alone, and not in any great degree to their sires. He would then breed Berne to her son, Hermann II, thus strengthening by inbreeding the Berne strain and its excellencies. Suppose he felt it was Hermann who had made the outstanding contribution. He would then breed all the does to Hermann, Berne herself again, out breeding, his daughter Berne II, inbreeding, and his two granddaughters Berne III and Herma, line breeding. (It will be noted that the possibilities of inbreeding and line breeding from a sire's line are far greater than from a dam's line, as the dam can be bred to her descendant only the one time each season, while the sire can be bred to all of his descendants each season.) If the breeder was right in his first decision, he will very slowly build up a group of animals that more and more represent Berne's line and her type. If he was right in the second illustration, he would very rapidly establish a whole herd of does that represented

in the main Hermann's type and his excellencies. If, however, Hermann had some undiscovered weakness that had been offset or balanced as long as he was mated to unrelated does, as soon as he was mated to a group of his own descendants this weakness would appear with fatal uniformity in his inbred and line bred kids.

Dangers of Inbreeding.—Now just what do we mean by an " unsuspected weakness "? The reply to this question lies in part in Chapter X in the story of the little wild buck kid who perished. Let us set side by side with that story another taken from the annals of any well-managed herd of pure bred animals in the United States to-day. So scarce, so highly valued are these pure bred animals that no effort or care is begrudged to the kids, whose arrival is always attended, even if in the middle of the night. To begin our story, a pure bred doe, choicest of the choice, is about to kid. In a spotless pen, bedded deep with fresh, sweet straw, the little ones arrive, a fine big doe first, then a buck—a good little buck, not quite so peppy as his sister, still a good little buck. As in the story of the wild doe, sister arrives first at the source of supplies. But as soon as brother is dried, as soon as he essays his first tottering steps, eager hands are stretched out to help him. He is guided at once to the waiting meal. Sister, to be sure, had had her fill, but has hardly made an impression on that great, generous udder. Little brother drinks and drinks, and comes

again until he can hold no more, and goes to sleep. So from day to day, if mother goes out with the herd and sister beats him to dinner when she returns, it makes no difference, there is always more than both of them can manage, try as they will.

This buck does not have to follow the herd. He stays with the other kids in dry, warm, sunny quarters, romps and plays or snugly sleeps while mother is away. Moreover, grain and hay and tempting green stuff stand at hand to coax his young appetite. He grows, of course. He becomes a splendid big buck. He is bred to sturdy, unrelated does. He passes on his own beauty and his mother's heavy milk yield to his daughters. Now, shall we breed them back to him? Try it. The weeks pass, the inbred kids arrive. Beautiful kids, true to type. "Their sire all over," says the proud owner. But why don't they get on their feet? He helps them carefully. Why don't they nurse more vigorously? He coaxes them patiently. A few days pass. Here is a kid sick with the scours. The scourge spreads, is fought, is overcome. Colds appear, some kids die. Some survive, but the puzzled breeder notes they make no such growth as did their dams. What has gone wrong? "Inbreeding," says he, "never again! I've learned my lesson."

But he hasn't learned it. Inbreeding is not at fault; it was his ignorance of his buck that was to blame for his disaster. So tenderly had his beautiful buck been cared

for all his life that there had never been one single test of his vigor and constitution. His lack in this respect lay hidden until it appeared in his inbred kids. Turn now to the two wild kids. The same type of a buck, in Mother Nature's hands, promptly perished. That his sister survived was sufficient proof of her hardiness. The buck that led her herd, when she came to breeding time, had passed every test of early hardship, and, in addition, had fought his way to leadership over all the other bucks that had survived. It was safe to mate those two and ask no questions about their pedigrees.

It is often said, "Nature pays no attention to consanguinity." Well, we would not need to pay attention to consanguinity if we had the nerve to put our animals through all the tests that Mother Nature does. Although it is apparent that the honest breeder must be willing to cull his pure bred buck kids relentlessly, still, with such valuable stock, raised in artificial conditions, it is neither practical nor desirable to apply to them the same tests that the wild buck must meet. Therefore, we have here one of the fallacies to which we have referred before, namely, the belief that we can safely inbreed or line breed our stock because wild goats breed that way. In this delicate task of breeding, good judgment, observation and patient experimenting must be our guide, and never Mother Nature. These remarks close our advice on the subject of choosing a buck.

Care of the Buck.—*The Buck Kid.*—One of the most remarkable, one may almost say appalling, facts about goats is their precocity. If born late in the year a kid of two months old, buck or doe, will come in season with the rest of the herd, and while their unsuspecting keeper is still regarding them as infants, they will have started on their lifework of reproduction. A good many instances are known of does at seven months old bearing a good sized pair of twins and developing milk for them. Such precocity, however, is at the cost of the little doe's own future. She will be stunted in growth and limited in milk production all her life. The young buck as well, at two months old, if left unsuspectingly with the does, will promptly get his mother, his twin sister, and any other available doe in kid, to his own consequent loss of growth, if not his final loss of usefulness.

Separate the Sexes.—Even those bucks who are born in the early spring, long before the season begins will harass the little does when a month old, and for the good of all concerned the doe and buck kids should be separated at about that age. The separation should be complete, the buck kids going to a distant pen, where they cannot see, hear, or smell the does. Then when the season comes on, in August, or a little later, the young bucks are spared to a considerable degree the intense excitement consequent upon the season. If a young

buck is left adjacent to the does when the latter are all coming in heat, his excitement and his violent efforts to reach them result in a loss of appetite and of flesh, and a deplorable arrest of his growth and development. Carried too far, this propinquity of the buck kid to the does in heat may result in his permanent loss of fertility. The importance of quarters for the bucks widely separated from the does is quite apparent.

Companionship Important.—The buck kid in a distant pen, with other male companions, plenty of room for exercise of a rather violent sort, and abundant and varied rations, such a kid comes safely through his first season and attains his full promise. He must not be left alone, however. Lack of companionship may result in the inception of destructive habits, and in any case is a cruel torture to the little fellow, who is of all animals the most sociable and the most dependent upon companionship for his contentment. If there is but the one buck kid, a wether of the same age will serve the purpose.

However, even under the most ideal conditions he will show some effects of the season in loss of appetite and a slowing up of his rate of growth. For this reason it is very desirable, in purchasing a buck kid, to obtain one born in the late winter or very early spring. Such a kid will have been completely weaned and will be well advanced in his growth before the season begins. A

buck, however, born in May or June, must go through the process of weaning at the very time he is being subjected to the excitement of the on-coming season, a double handicap that only the sturdiest kids can carry successfully.

Detailed discussion of the feeding of buck kids will be found in Chapter XIV, details of proper housing and equipment in Chapter XVII, and other general directions for the care of kids in Chapter XII.

Care of the Mature Buck.—The same suggestions given for a buck kid as to separation from the does apply equally to the mature buck. His limit of usefulness during the breeding season is greatly enlarged if he is kept entirely free from the excitement caused by the proximity of the does. His appetite and his general condition are also better maintained, thus preserving for the sire that valuable store of vitality so essential to the on-coming crop of kids. Luckiest of all is the herd whose equipment includes a large free range for the bucks, a range that offers considerable variety of feed, and is steep and rough enough to provide strenuous exercise. A buck who has this opportunity for freedom and exercise, who is kept far away from the does, and who has the companionship either of other bucks or a wether, such a buck, whatever his breed, will come through the season with the smallest possible evidences of the tradi-

tional " billy-goat " offenses, noisiness and smelliness. He will, moreover, bring to his work a superb vitality that will ensure the success of the kidding season. If for convenience in breeding he must be kept during part of the season nearer to headquarters, still his pen should be entirely separated from the herd, though he should have companionship.

Washing and Clipping.—If he is a Swiss buck it would be advisable early in August to run a pair of clippers over him, denuding him more or less of his shaggy coat, and to reduce his great beard to a neat " goatee." Thus trimmed, it is no great task to give him at regular intervals a warm bath with plenty of soap and a good disinfectant. The same care applied to his sleeping quarters—cleanliness and disinfectants, together with the suggestions previously offered as to his care—will bring the buck through the season without his becoming the intolerable nuisance that is usually associated with the word " billy-goat."

Temperament.—The traditional " billy-goat," moreover, is a vicious, treacherous creature, to be approached only by a stout heart and a strong arm. Nothing could be further from the facts if we have in mind a well bred buck who has been properly reared. None of the herd are so affectionate by nature as the bucks. If they are occasionally rough in jostling their keeper, it is only be-

cause of their eagerness and their immense, unwieldy strength, never the outcome of intentional attack. A headstrong buck in a tremendous hurry to get to a waiting doe can be easily controlled by a firm grip on his beard and a tap on his nose with a small switch. If, however, the keeper habitually loses his temper and strikes or kicks his buck, real viciousness is in time aroused, and the animal, even though hornless, becomes dangerous. There is not the slightest necessity of such an occurrence. A full grown buck weighing, say, two hunded fifty pounds, is an almost unbelievably powerful creature. Yet there are many herds where the entire charge of the buck and the breeding is in the hands of women, sometimes small, light women, who have no difficulty at all in controlling these huge, impetuous, powerful animals.

FIG. 35.—The best of pals.

Care of the Feet.—One more important point must be discussed in regard to the care of a buck; that is, the care of his feet. What we have to say on this subject applies equally, however, to all goats—bucks, does, and goatlings, and sometimes even to kids.

FIG. 36.—Mrs. H. W. Barker, New Westminster, B. C., and her champion buck Bralef King Franz, 1778, an immense animal, showing amiable disposition.

The outer horny shell of a goat's hoof grows constantly and rather rapidly. If the animal is on range, where the ground is gravelly or rocky, this growth is normally taken care of, the feet need no special attention. If, however, the animal is confined, or ranges only on soft, loamy soil, this growth must be regularly and carefully pared away, either with a knife blade or a small pair of hoof clippers. If this is

neglected the overgrown hoof will gather dirt and small stones in its crevices, and soreness, rot, and lameness will result. We have said a goat on gravelly or rocky ranges "normally" needs no attention to its feet. There are frequent exceptions to this statement. Many goats have feet that do not set on the ground exactly square and true. Such feet will tend to grow unequally, and in spite of the friction of travel, will become overgrown in some direction. If this tendency is noted and recognized early in the animal's life, and if its feet are kept constantly trimmed, the fault can be to a large extent corrected—at any rate, it is controlled. If, on the other hand, the feet are neglected, the fault tends to become fixed and more pronounced, until actual deformity may result. Therefore, too much stress cannot be laid on the necessity of careful supervision of a goat's feet.

Housing.—Discussion of the proper housing and equipment for bucks and their proper rations will be found in Chapters XIV and XVII. One point only may be noted here. No matter how stout and high the fence, no matter how secure the gates and doors of his quarters, rest assured that the buck will sometimes escape your closest vigilance and will leap suddenly into the midst of the does. If in the season, some does will certainly be in heat, some unplanned matings will certainly occur. If your herd contains animals of one breed only, the worst

that can happen will be the breeding of an immature doe, or too close a mating. Neither are necessarily a disaster. But if there are two breeds represented, it is sure to be your best pure bred doe that gets in kid to a buck of the other breed—a whole season's profits lost in an instant. This is the most potent argument, though there are others, for the use of one breed only in any well managed, progressive herd.

The Use of the Buck.—How many does can a buck serve? With our present scarcity of fine, pure bred stock this is an important question.

A buck kid, born say in February or March, can be safely used in the fall for five or six does, if he is in good condition, and if he is being cared for in accordance with the suggestions given above. He should not be used until eight months old, and at intervals of two or three weeks at least.

A buck in his second year can safely take twenty-five does, in his third year fifty, and at maturity one hundred to one hundred fifty. These rather generous figures rest on the basis that the buck is in perfect condition, in good appetite, and is entirely separated from the does except for the instant of service. They also assume that each doe has one service only. In spite of the general feeling that two services are safer, one is amply sufficient, if it is successful. The breeder is aware that

the business is properly completed when the doe after the buck dismounts, draws her hindquarters up conspicuously. Some bucks will mount many times before actually giving service, but this is the reliable indication that no further use of the buck is necessary. The doe should then be removed instantly to her own distant quarters.

It may seem to some breeders that the amount of service we have suggested is excessive. In herds where the bucks run loose with the band during the season it is the custom to count upon not less than one mature buck to every fifty does. For if a buck is left to himself with the does he will serve the same animal over and over, so considerably limiting his usefulness to the herd. Also, where a buck is thus left with the herd, his life of usefulness is limited to two or three years. When, however, "hand breeding" only is followed, and the buck is cared for as we have outlined, a strong buck can serve one hundred fifty does with impunity, if the services are well distributed over the season of six months. Such a buck, moreover, can be relied upon for unbroken usefulness to the age of ten years or more.

We can suitably close this discussion with a remark made with great emphasis by a breeder of long experience, "If I had a valuable buck I would rather have him used for one hundred fifty does that were hand bred than to leave him loose with ten does only for the season."

QUESTIONS

1. What importance should we attach to the selection of a buck to head a herd?
2. Name some of the points that should influence our choice of a buck.
3. What individual traits should we look for in selecting a buck?
4. What is meant by milk inheritance? Illustrate.
5. What milk records should be considered in choosing a buck?
6. Of what importance to a buck are show ring awards?
7. Define cross breeding, out breeding, line breeding, inbreeding.
8. What is the safest system of breeding for the beginner to use?
9. What are the disadvantages of cross breeding?
10. Should cross breeding ever be practiced? If so, when?
11. What result does one aim to achieve in practicing either line breeding or inbreeding?
12. Give examples of inbreeding; line breeding.
13. What are the dangers of inbreeding?
14. At what age should the buck and doe kids be separated?
15. Under what conditions should the young buck kids be kept after being separated from the doe kids?
16. Name several important points to be taken into consideration in caring for the buck.
17. How many does can a buck serve?
18. What is meant by "hand breeding?" What are its advantages?

CHAPTER XII

THE HOPE OF THE HERD—THE KIDS

The New Born Kid.—Is the new born kid to be raised by hand, or is it to be left to the care of the mother? The arguments for each of these alternatives are presented in Chapter XIII. The important matter is that the decision be made before the doe kids, so that preparations for the one method or the other may be in readiness.

Left to the Mother.—If the kid is to remain with the mother the pen should be bedded deep with clean, fresh straw. It is convenient to have small, rather shallow boxes at hand, partly filled with clean, crumpled newspaper. It will facilitate the doe's task of cleaning and drying the kids if each at birth is placed in one of these boxes. As soon as they are dry and on their feet they will tumble out and make for the doe's bag. If there are three, sometimes assistance may be needed to make sure that each kid gets its fair share of the colostrum milk, so essential to its proper start in life. If the kids are of any value at all, they should not be left to the care of the dam unless one is assured that her milk yield is ample to take care of the number she is to raise.

It is safe to say that the great majority of goats are

splendid mothers, devoted and painstaking. The only exception to this rule is perhaps the young Anglo-Nubian doe. Considerable experience has shown that the does of this breed cannot always be trusted to own their kids at first. Such a doe may lick the kid for

FIG. 37.—In the best of care. This Nubian mother did not need to be coaxed to her duty.

awhile perfunctorily, but she may not be willing to stand for it to nurse. It is probably less work in the end, and safer, to take the kid away and raise it by hand. However, if circumstances make it necessary for the doe to keep her kid, patience and coaxing will usually induce her after a time to own it properly, and it can then be left safely to her care.

Raised by Hand.—If the kids are to be raised by hand the proceeding is quite different. By way of preparations, one should have ready a quantity of old, clean newspapers, a thick, soft towel or two, a box of boracic acid powder, a nursing bottle marked for ounces, a nursing nipple, and a box and tray of the sort described in Chapter XVII. If the kids are to be removed at once, sawdust or fine shavings makes the best bedding for the doe, as it is cleaner and more absorbent than straw. It will not do, however, if the wet kids are to be left to sprawl around in it. With this method of handling the kids it is imperative that someone be in attendance at the moment of birth. Once the doe gets a chance to lick her kid, the ensuing separation becomes a painful task.

Treatment at Birth.—Thus prepared, have in the pen a large, thick layer of newspapers. Slip this under the arriving kid, and as soon as it is free from the mother wrap it up and carry it immediately to a warm kitchen or bathroom. If the cord does not break of itself at the moment of birth, break or cut it with antiseptic scissors about four inches from the body of the kid. Clean its mouth and face and wipe off part of the enveloping matter. If one is working single handed it may now be necessary to leave the kid and return to the barn to greet the next arrival. If so, place the kid in a box partly filled with crumpled paper and deep enough to insure its staying there. If the room is quite warm and free from drafts

the kid, wet as it is, can be safely left for quite a time, until the other kid or kids have arrived and joined the first one. Each kid, then, should be wiped as dry as possible by using a quantity of crumpled paper, and finally by a brisk rub with a dry, warm towel. The kid should then be turned on its back and the navel, with its attached cord, should be plentifully dusted with boracic acid powder. They can now, one and all, be placed in the regular kid box, which should be bedded deep with fresh, clean straw. The mother having been milked, each kid should be given a share of the colostrum. A rather small doe kid may not take more than two or three ounces of this first feed. A husky little buck will suck on indefinitely, but five ounces is probably a safe limit for the first time.

Nipple Feeding.—No difficulty at all is encountered in getting the kid to take the nipple and to suck if it has had no experience previously of nursing its mother's udder. Once it has nursed the mother, however, it is often a nerve racking and time consuming business to "break" it to the bottle. The rubber nipples on the market are usually provided with holes too small to satisfy the impatient kid. It is convenient to enlarge them by a small slit in the end.

Pan Feeding versus Bottle Feeding.—At this point the question may arise, "Why teach the kid to nurse, rather than to drink?" These two methods of feeding

kids each have their merits and their drawbacks. Both have been used successfully, and it is no harder to teach the new born kid to drink than it is to teach it to nurse. The chief argument in favor of pan feeding is that a pan or bucket is easier and less time consuming to take care

FIG. 38.—A galvanized mother.

of than a bottle and nipple. The chief argument in favor of nursing is that a normal little kid is a tremendously eager, impetuous creature, and if allowed to drink its milk will gulp it so fast as to incur the danger of indigestion. Taken through a nipple the process is necessarily slower and therefore safer. In the larger

and more successful herds it is noted that nipple feeding rather than pan feeding is the prevailing practice.

There is one other point in favor of pan feeding in the case of buck kids. If one is raising a number of bucks it will be found that these rough, strong little fellows will in their eagerness destroy the nipples at an

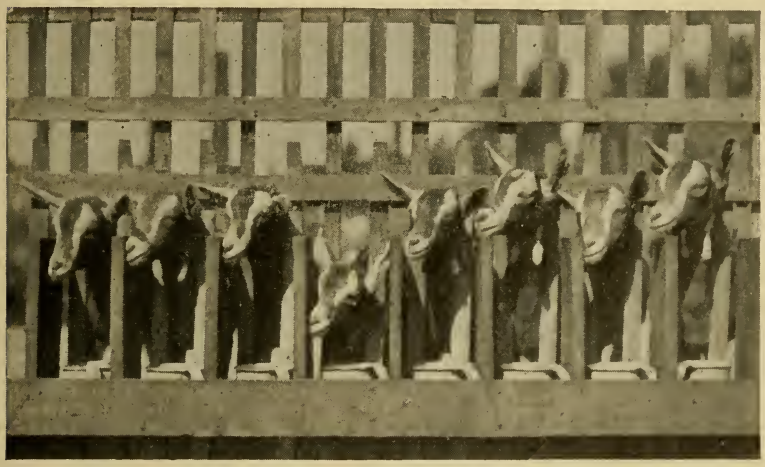


Fig. 39.—Ready for pan feeding. (Courtesy O. H. Freyschlag, San Jose, Calif.)

alarming rate, which makes a serious inroad on the budget. This may well constitute an argument in favor of pan feeding for buck kids from the beginning. In every case, however, the decision must be made before the arrival of the kids and must be adhered to thereafter, for it is very difficult to change later the method which the kid learns at birth.

Weight at Birth.—A few more points may be noted here that may be of interest to the beginner. A new born doe kid should normally weigh six to eight pounds. A five or four pound doe may develop into a medium size animal of merit, but the figures given are normal for a kid that is to make a really creditable development. The buck kid should weigh seven to nine pounds. One is hardly justified in preserving for future stud use a buck kid that weighs less than seven pounds at birth. One often hears the statement, " Sometimes the tiniest infant will grow into a very large man," but considerable experience has shown that no such consoling belief is to be relied upon with goats. We want them large, strong, and vigorous from birth.

Condition at Birth.—Some kids show rather distressing weakness of the joints at birth, walking with the first joint of the forelegs turned out, for instance, or with the forelegs bowed out at the knees. If proper care has been given both to the sire and dam such kids are very rare. Still, when they do occur, no alarm need be felt, for the kid, carefully tended, will soon outgrow this weakness. The process of strengthening the joints is hastened by the use of some simple kind of splint, a piece of stiff cardboard, padded inside with cotton, rolled snugly around the limb and bandaged in place firmly but not too tightly. Some kids of the Swiss breeds, whose

ears should stand stiffly erect, are born with their ears hanging limply, like Nubians, and it will be several days before they assume their proper form. It not infrequently happens that a breeder of Swiss goats will sell to a beginner a doe in kid, only to be called up on the 'phone, at the time of kidding, to hear a distressed voice say, " Yes, the kids came all right; they're fine, but you must have had some accident at breeding time, the kids have Nubian ears! "

Sore Eyes.—Sometimes it will be noted shortly after the birth of a kid that it has a sore eye. Examination reveals that the eyelashes are turned in. They must be carefully rolled out, and the eyelid must be held in its proper place for a moment by a pad of cotton wet with boracic acid solution. The inflamed eye can then be relieved by being washed with a few drops of the same solution, and no further trouble will follow. Such a case must be promptly cared for, however, or a very sore eye will result.

Avoiding Inflammation.—Sometimes if the mother has not properly licked the kid, or if some disinfectant like the boracic acid powder has not been used on the navel, it will in a few days show indications of inflammation, perhaps of pus. Wash it with a mild disinfectant, and paint with iodine. Ordinary precautions of cleanliness, however, will forestall this possibility of trouble.

This closes the list of instructions necessary for handling the new born kid.

Care of Kids the First Four Weeks.—If they are in the care of the mother, no special thought need be given to the kids except to be sure she has abundant milk for them and to be sure they have no opportunity to become damp or chilled. The doe should be left in the pen with the kids for three or four days. Then if she is to go out with the herd for pasture, or is to be staked, it must be arranged that she return to the kids at intervals of not more than five or six hours.

Proper Feeding.—The hand fed kid should have four feeds a day, at six and eleven in the morning, and four and nine in the evening. If fed on this schedule, it is safe to give them all they want. A healthy buck will rapidly arrive at a pint a feed for his average, and a doe will not be far behind. It is possible to raise a kid on three feeds a day from the beginning. But with such long intervals the hunger of the kid is very likely to cause overeating and its resulting ills of indigestion and scours. If it is absolutely necessary to limit the kid to a three feed schedule, he must be kept to a pint at a feed no matter how hungry he is. A pint at a time is about all that a small kid's stomach can safely negotiate. It should be at a temperature not less than 105°. They will drink it astonishingly hot, and suffer no harm. If,

however, it is given them even a little too cool, the result is likely to be scours.

If a lot of kids are being raised together, a bottle for each is certainly too much trouble. In such cases a "gang-feeder" is employed, as described in Chapter XVII. If pan feeding is used for a lot of kids, a system of little stanchions must be planned to protect the milk from the disastrous onslaught of the kids. Such an arrangement is illustrated on page 129.

Milk Substitutes.—Is there any substitute for goat milk that can be safely used in raising kids? Cow milk, of course, is the most usual substitute when invalids or babies need the goat milk. A kid does very well on part rations of cow milk, in equal parts with goat milk. But if cow milk is to be fed alone, it must be modified, as it forms, undiluted, a curd in the kid's stomach too tough for easy digestion. A gruel made of good, clean, rolled oats (two cups to a gallon of water), cooked thoroughly an hour or more and strained, makes a safe, satisfactory and economical modifier for the cow milk. It should be used one part gruel to two or three parts cow milk. A goat's milk is not very palatable for the first week or two. If the kid has the mother's milk for that time and is then changed gradually to the mixture of gruel and cow milk he will do about as well on it as if he were given his proper rations. There is a little more danger of

scours from overfeeding, and the amount taken at a feed must be regulated a little more vigilantly for that reason. Otherwise, this is a very satisfactory substitute.

FIG. 40.—The first feed of hay. Las Cabritas kids two weeks old.

We do not know of anything else that can be recommended safely.

Solid Food.—By the time the kid is two weeks old an attempt should be made to interest him in solid food. Nice hay and some rolled oats or barley should be placed where he can experiment with them, also a little green stuff of some sort, grass, weeds or leafy twigs. The latter should never be offered immediately after the milk

feeds. The best way to interest a little kid in green feed or hay is to make a sort of bag of chicken wire, fill it, and hang it high enough that the kids will have to climb up and stretch hard to reach it. The delight of this game will keep them nibbling at the feed bags a good deal of the time. The grain must be put in boxes protected by stanchions, as described in Chapter XVII.

General Care.—*Kid Boxes.*—So much for feeding the very young kid. The next most important point to emphasize is the importance of keeping him *always dry and warm.* Sudden chill or damp is the most treacherous enemy of the hand raised kid. The kid boxes described in Chapter XVII are ideal. Their depth protects the kids from drafts, the deep straw keeps them warm, and the wire bottoms prevent the accumulation of damp, which is as dangerous as chill. An ordinary box *is not safe.* No matter how warm and well bedded, it cannot be kept dry, as the amount of wetness created by one or two kids is quite astonishing. For the first week the kids should spend most of their time in these boxes, in a warm, tight room or pen. If the weather is cold the box should be covered over at night except for a place for ventilation. Four or five kids in a box is better than one or two, for warmth.

Exercise.—But the kids after the first twenty-four hours should be put out each day for an hour or two, if

there is any place where they are secure from wind, cold, or damp. Even at a day old they must have something to play with. An overturned box about eight inches high and a four foot board slanting up to its edge make a splendid apparatus for the wee babies' first attempts

Fig. 41.—Exercise for the kids. Important factor in their proper development.

at frolicking. As they grow hardier, whenever the weather permits they should have freedom for headlong scampering and more venturesome heights and slides to test out and strengthen their growing muscles. It is a pity to enclose these gay, ardent little creatures within a fence, but if it must be done, their pen should be amply large for freedom, and as well provided with interesting

apparatus as the best equipped playground for human "kids." In freedom and exercise lies, to a great measure, the secret of raising lusty, vigorous kids. Suggestions for apparatus are found in Chapter XVII.

When they are old enough to have outgrown their boxes, the same care must be taken to protect their pen

FIG. 42.—Big for his age. Three week old. (Courtesy Arthur Wights Santa Cruz, Calif.)

from cold, draft, or dampness. A board floor, sloped for drainage, a layer of sawdust or shavings on the floor, and straw bedding above that makes the warmest and safest pen. All litter must be removed *daily,* the board floor must be allowed to dry, and be covered again with fresh, dry sawdust and straw.

Kids that are handled and fed thus will reward you

by coming to the age of one month full of vitality and incredible energy, without any setback of illness or retarded growth. They should weigh normally at this age eighteen to twenty-two pounds for a doe, and twenty-two to twenty-five pounds for a buck.

One Month to Four Months Old.—At this age the bucks are separated from the does, and the milk feeds

FIG. 43.—Salome of Oakdene, two months old. (Owned by Mrs. T. B. Dean, Walnut Creek, Calif.)

are reduced to three a day. By this time the kids are ready to take on solid food as an important part of their regular rations.

Necessity for Varied Rations.—It is essential to the best development of a kid that he, or she, learn to eat solid food as early as possible and as abundantly as possible. To accomplish this end it is important to bear in

mind that goats, and especially kids, are very "capricious" creatures. Curiosity and variety play a far larger part in developing their food capacity than appetite. Therefore to obtain the best results it is necessary to change their food completely at brief intervals. This is a great deal of trouble, but it pays in the end. For one thing, it saves milk, the most expensive food one can give the kid. For another, it develops a more vigorous and larger animal with a larger digestive capacity, resulting in more vitality and potency for a buck, and heavier milk production for the doe.

A Tested Feed Schedule.—Here is a system of feeding that has been well tested and has given splendid results. In the morning, if weather permits, turn the kids out for a romp before the first feed, which is milk. Immediately after, fill the feed boxes with hay, the best obtainable of its kind. As soon as they have eaten what they want of the hay, drive out the kids, clean the remnants of the hay into a canvas sheet to feed to other stock, and refill the boxes with green stuff, freshly cut. For this purpose green vetch and oats, sown together, is an excellent feed, easily raised, easily cut, greatly relished by the kids, and very nutritious. About noon clean out the remnants of the greens and put down a handful of grain at each stanchion. (For the grain mixture to be used, see Chapter XIV.) At two o'clock milk again,

then hay, a different kind from the morning feed. Oat hay and alfalfa or clover hay are the two best varieties. At four greens again (here, too, a variety is desirable), at six grain, at eight the last feed of milk, and afterwards fresh hay to nibble during the night. One will be astonished at the rush of tremendous eagerness that greets each new offering of feed, and a moderate allowance is rapidly consumed. If, however, all of these feeds stand always at hand in large quantities the kids soon lose interest in them and save their appetite for the three milk feeds.

When to Wean.—Under the system described the kids soon begin to lose their eagerness for the evening milk, being by that time pretty substantially full of solid food. The noon milk feed can be discontinued at two and one-half months old, the evening feed at three and one-half months, and by four months old the vigorous kid, with his well developed appetite for solid food, will have weaned himself voluntarily in many instances. Unless a kid is very backward in development this program for weaning will probably coincide with his own gradual loss of interest in milk, and it is doubtful if there is any profit in deferring the time of weaning beyond four months, providing the capacity for solid food is well developed.

After weaning some trouble must still be taken to

give the kid varied and abundant rations, in which a daily supply of green feed plays an important part.

Exercise.—If the kids belong to a herd where the does are sent out daily to feed on range, the question arises, " When should the little does be sent out with the band? " Experience indicates that this date should be postponed rather than hastened. Four or five months

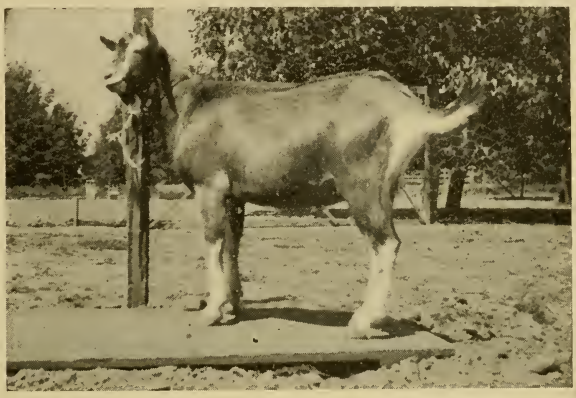


FIG. 44.—Allesandro, 1101, six months old. (Courtesy L. C. Buhl, Pomona, Calif.)

is certainly early enough, and then only when the herd travels rather moderate distances. A kid sent out to pasture too young ceases absolutely to grow for awhile and is probably somewhat stunted permanently of its full possibilities of growth. While they should not be forced to travel too early, the same suggestions as to freedom and incentives to exercise that were offered for the tiny kids are quite as useful for the older kids. Al-

though after the first month the healthy kid gains rapidly in hardihood and overcomes to some degree his susceptibility to cold and damp, still it is wise to observe for all the kids the same precautions are necessary for the first month.

Fig. 45.—Las Cabritas Don Gaspar just weaned, 91½ lbs. not quite five months old.

Proper Condition at Weaning.—A kid at weaning time, four months, should weigh, for a doe, about forty to fifty pounds, a buck fifty to sixty. They should have completed at that age the change of coat (which begins at about two and a half months), and should have a smooth, glossy appearance, indicating a state of perfect health. It should not be fat, and especially it should not be "pot bellied." Too fat a kid indicates lack of balance in the rations. A pot bellied kid betrays a scant ration of milk or grain feed, forcing the kid to fill up on hay beyond his natural capacity. The *well fed* kid will not be fat, but will be covered with a

smooth, even layer of flesh, no bones showing, no scrawniness in the neck, while every movement will reveal the full development of the young muscles.

A kid coming to weaning time in this condition, perfect in the beauty of race and type, overflowing with

FIG. 46.—Supreme Captain Franz, 2485, 8 mo. old. (Owned by Mrs. Inez Glahn, Los Angeles, Calif.) This picture, also Fig. 44 and Fig. 45, illustrate perfect condition for a young kid weaned from milk.

affection, gleaming with health, and dancing with high spirits—such a little creature is full and ample reward for the exacting care of his rearing.

Horns.—There is probably no need to discuss the disadvantages of horns in a herd of milk goats. There is simply no place for such animals to-day. The goat-

breeder who would ignore this side of his business is headed for every possible kind of mischief, vexation, and loss in his own herd, and the loss of his sales as well. We then take it for granted that the only point of interest in this matter is—how to get rid of them!

By far the best way is to breed them out. Use only hornless bucks, and destroy your horned buck kids. There will, of course, be exceptions to this rule. Some bucks will seem far too valuable in other respects to be destroyed for this defect. As for does born horned, we are not in a position as yet to spare them. So for some years to come, however great our care, some kids will be born each year with incipient horns. These are so easily destroyed in the young kid, however, that there is no excuse for a pair of horns appearing in any well managed herd.

Dehorning.—No one wants to run the risk of mutilating the head of a naturally hornless kid. Yet the dehorning must be done almost at birth, before any growth of horn is evident. How, then, shall we distinguish the hornless head from the horned in the new born kid?

How to Detect Horns.—On a head naturally hornless, the wet hair at birth usually lies perfectly smooth. If there is on either side a twisted tuft of hair, the chances are the kid is horned. Do not be guided by this test alone, however, as it occasionally happens that the

irregular tuft of hair does not indicate horns. The head where the wet hair lies uniformly smooth and even may be safely and thankfully dismissed. The suspected head may be left until the third day after birth. Then take a pair of curved, blunt surgeon's scissors (a necessary part of every goat keeper's equipment) and clip the hair off one side, where it appears twisted, covering quite a surface, and clipping close. If the head is hornless, the stubble of the clipped hair will appear uniformly over the exposed surface. If horned, a bare spot will appear, about a quarter inch in diameter. Place your finger on the suspected spot, and push it back and forth. If the scalp moves freely, the kid is hornless. If it is immovable at that point, it is horned.

A naturally hornless animal at maturity shows two well rounded bumps or knobs on the forehead. These rounded knobs sometimes appear slightly developed even in the new born kid, and may be mistaken for coming horns. But the bare, hairless spot and the immovable scalp are the really dependable tests for the coming horns.

Operation of Disbudding.—*Caustic.*—The horn grows from the epidermis. If the horn producing cells are destroyed and replaced with scar tissue, no horn grows. There are two methods of destroying this portion of the epidermis, burning it with caustic potash, or cutting it out. For the caustic method, have at hand a

supply of caustic potash sticks, a fresh supply, kept in a dark bottle tightly corked. Break off a piece an inch or so long for each operation, wrap one end in tin foil to protect the fingers, and throw it away after using. Do not return a used piece to the bottle. Other equipment consists of the curved scissors, some thick kind of grease, and some cotton. Clip all the hair off the head, short, down close to the eyes, and around the ears. If the inexperienced hand uses too much caustic, it will run, scarring deeply wherever it goes, and horribly blinding the animal for life if it reaches the eye. Grease neutralizes the caustic. Rub it well into the skin in a circle around the head, thick over the eyes. If the hair is not entirely clipped, the grease lies on top of the hair and the caustic runs under it.

Someone must hold the kid firmly while the grease is being applied. If it jerks, and the grease accidentally touches the spot to be treated with caustic, the caustic will not take effect. After the grease is applied, moisten slightly the end of the caustic, on a bit of wet blotter, and rub the bare spot as a center and around it over a surface at least as large as a five cent piece. For a buck kid, cover even more surface. Rub until the skin begins to break over the entire space. That is enough. When both sides are done, the kid must be held in the arms for half an hour or so. If it is not held, the first thing it will

do upon being released will be to rub its stinging head with its foot, so spreading the caustic to the eye. Hold it carefully then until the pain stops and the kid no longer tries to rub its head.

Just over the eye is an artery. Very rarely this artery will start bleeding if the caustic is applied over too large a surface. The cotton at hand must be used promptly to staunch this bleeding, else the flowing blood will carry with it the dissolved caustic, scarring where it touches. This bleeding, however, very rarely occurs.

This operation of disbudding with caustic is most successful at three to five days after birth. If delayed longer the horn will have begun to grow. It must then be sliced off with a sharp knife, and the caustic be applied as soon as the bleeding is staunched. A surface as large as a quarter must be covered for this older kid.

Cutting.—The other method of disbudding, by cutting out the horn bearing epidermis, requires the following equipment: surgeon's scissors, *very sharp;* a plumber's arch cutter, very sharp, one inch diameter; surgeon's forceps with small claws at the end; alcohol; antiseptic cotton and bandage; surgeon's antiseptic powder, and an antiseptic ointment. Clip the hair and wipe the head carefully with alcohol. An assistant must now hold the kid firmly between the knees, fingers of each hand under the chin, thumbs ready to place above the

eyes. The operator places the circle of the cutter over the horn bud and slightly in advance of it, presses very hard, turning the instrument at the same time, until the edge of the cutter has cut through the skin clean to the bone at all points. The assistant quickly places his thumb over the eye, pressing firmly, to control the artery. When both sides are cut, the operator takes the forceps, slips the claws under the edge of the severed disk, and clamps them, and pulls off the circle of skin, leaving the bone bare and clean. Should the first cut be incomplete, the scissors are used to sever the portion uncut.

As soon as both disks are off, the wound is plentifully sprinkled with the antiseptic powder (which tends to check the bleeding), and over the head is laid a pad of antiseptic gauze thickly smeared with the ointment. The bandage is then applied, binding the dressing in place firmly, but not tight enough to restrict the throat. The kid is then returned at once to its box, no further precaution being needed except to see that it is alone, or with another dehorned kid, so that it will not be molested by the rough play of other kids. It is well to glance at the head occasionally for a few hours, as sometimes bleeding will begin after the dressing is complete. If it does, take off the dressing, staunch the flow of blood, and dress again. If it is not promptly staunched by a little pressure on a wad of cotton, apply the cotton wet with vinegar.

This method requires more equipment and considerably more "nerve" than the caustic operation. Its advantages are: no danger from the possible caustic scars, a clean cut wound, which heals more quickly than a burn, and less pain to the kid, who appears to suffer not at all after the first quick, clean cut, while the pain of the caustic persists for some time. Also this method takes far less time than the caustic.

All the instruments and dressings used in this operation must be scrupulously aseptic. An ointment very useful for the dressing is "Unguentine." The instruments must be sterilized after using. The dressing can be safely removed from the kid's head a day or two after the dehorning, and the scars rapidly heal and are covered over with new growth of hair, leaving a smooth, unblemished head.

This method of dehorning is best employed when the kid is about five days old, and can be used safely and successfully at the age of two weeks. At that age, however, the skin is thicker and tougher, making it somewhat harder to cut clean and quickly; also it is more firmly attached to the skull, and considerable force must be used to peel it off the bone.

At maturity a perfectly dehorned animal can be distinguished from one naturally hornless only by the full, prominent knobs of the hornless animal and the level

forehead of the one whose horn buds were artificially removed. So great is the comfort, peace and beauty of a hornless herd that the breeder who has achieved it will feel well repaid for the trouble of disbudding his little kids.

QUESTIONS

1. Discuss the care of the kid at birth when it is left to remain with its mother.
2. What will be the proceeding if the kids are to be raised by hand?
3. Compare pan feeding with bottle feeding for kids.
4. What is the normal birth weight of a kid?
5. Name several weaknesses which kids may possess at birth. What can be done to correct them?
6. Outline the method of raising a kid.
7. Give the main precautions to be observed in feeding kids.
8. When should the kid first receive solid food? Of what should it consist?
9. How should young kids be handled (aside from feed) up to the age of one month?
10. State the general value of milk substitutes for kids.
11. Of what use are varied rations in the kid's diet?
12. When should kids be weaned?
13. In what condition should a kid be at weaning time?
14. How can you distinguish the hornless head from the horned in the new born kid?
15. Describe two methods of disbudding.

CHAPTER XIII

THE HEART OF THE HERD—THE DOES

The Goatling.—At the close of the chapter on the kids we left our little doe kid, as well as her brother, at

Fig. 47.—A Toggenburg goatling.

the age of four months, weaned from milk, ready to join the "big herd," no longer a nursling, yet with a good

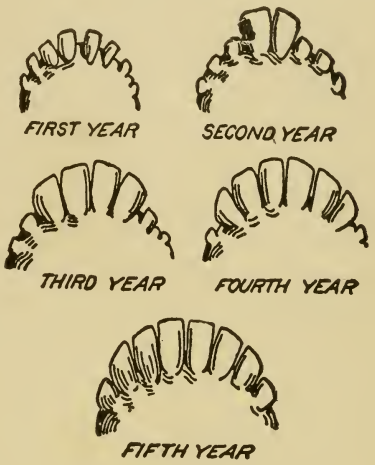
many months ahead of her before she enters into the functions of maturity; that is, before her first breeding. She is no longer handled in the same way as are the kids, and in any convenient arrangement of the herd, she is now removed from the kid quarters to quarters of her own until she is old enough to join the mature does. Her only duty for the present is to grow and to enjoy herself. To the little doe at this stage of her life we give the name "goatling."

It is a stage when she needs little individual care. Each kid passes under one's hands individually every day, to be given its milk. So, too, the milking does must be handled one by one, while the pregnant doe, bearing the precious burden of his hopes, is ever present in the thoughts of the breeder. But the care free little goatlings need only their shelter, their box of feed, and a place to play. Individually they need no care at all. It is the more important, then, that a regular time be set aside to inspect the goatlings, to make certain that each one is making the progress she ought, and that nothing is going wrong with her. Beyond this general advice, there are few special instructions necessary for the care of the goatling.

Suggestions as to housing, equipment and feed rations for the goatling are to be found in Chapters XIV and XVII. If she goes out with the herd, the question of exercise takes care of itself. If she is stall

fed, she needs the same free space for exercise, and the same play apparatus that were recommended for the kids. Her feet will need watching, too, if she is not on range.

Age to Breed.—When is she old enough to breed? "Mother Nature" says in the first fall of her life, at six to eight months old, according to the month of her birth. Many breeders follow this rule of Nature, others very earnestly advise holding the young doe to the age of eighteen months, so that she will come fresh the first time at about the age of two years, when she has completed her own body growth. The latter practice has much to recommend it, both in theory and in the excellent results obtained when it has been followed consistently in building up a herd. It is certainly the safest rule, and the breeder who has the courage to adhere to it year after year finds his reward in



TELLING THE AGE BY THE TEETH

FIG. 48.—Goats, like sheep and cattle, have no front teeth on the upper jaw—simply a hard pad of gristle. They have eight front teeth on the lower jaw, and under one year of age these are "sucking teeth," small and sharp. At about one year the centre pair drop out, and are replaced by two larger permanent teeth. Between the twentieth and twenty-fourth month two more large teeth appear, one on each side of the first pair. In the third year two more come in, and in the fourth year the last pair—one at each corner. At seven or eight years some of these teeth may become broken or fall out, or may be knocked out by accident before that time. Frequently, however, goats' teeth develop much more quickly than shown above, and many have their full mouth between the third and fourth year. Bulletin No. 64, Goat Raising in British Columbia. Department of Agriculture, British Columbia.

the uniformly large size of his does, their vigor and constitution, and their high average of production. Remember, Mother Nature did not have in mind the creation of a *milk* goat, yielding milk ten months out of each year, and ten to twenty times her body weight in each period of lactation. But that is what the goat breeder has in mind. To obtain his ideal, he must give his goatling time to finish her own growth before she is submitted to the task of reproduction.

Yet every breeder can point to animals who either accidentally or purposely were bred much earlier, but have, nevertheless, made a creditable growth and have developed into good milkers. We cannot but feel that such instances are the exception rather than the rule. and that repeated early breeding in any given line will result in diminishing both the size and the yield of the animals.

If it is necessary for any reason to breed before the age of eighteen or nineteen months, there are some points that will help determine the earliest moment at which a goatling may be bred with reasonable hope of her future good development. She should have replaced her two front baby teeth with the large permanent incisors, and should have completed the change of coat that follows the cutting of those teeth. She should weigh at least 90 to 100 pounds, and should be in good flesh and good

appetite. Granting these conditions, with care and abundant feed, she should not suffer in her ultimate development. It would not be advisable, however, to repeat this early breeding with her daughter and then again with her granddaughter.*

Indication of Season.—What are the signs of season, or heat, in a doe? Twitching of the tail, redness of the vulva, restlessness and noisy bleating are the usual indications that she is ready to go to the buck. If not prevented she will often break loose and find her way to the nearest buck even at a distance of several miles. This is a potent argument against any community permitting the existence in its precincts of a scrub or grade billy goat.

Duration of Season.—The does are usually in season, or in heat, about every twenty-one days. In most herds the season is well under way by September, and breedings are dependable through the following months up to the end of February. Many does come in season

* In the last year or two breeders of experience have been more and more inclined to try out the effects of early breeding, mating does as early as ten months. Complete reports on these tests are not available, but there seems to be a growing feeling that a doe is improved rather than handicapped by early kidding and lactation.

It is the opinion of the author that the milk goats of the United States have profited immensely by the precept and practice of our pioneer breeders, notably of Mr. Winthrop Howland, in this matter. The breeds are no doubt stronger and better established than if we had practiced early breeding indiscriminatingly with the imported stock and its increase. Upon the strong foundation thus laid very likely it is now safe in many instances to take a stand for early breeding. If this practice is backed by experience and good judgment, probably no harm will follow and time will be gained. For the inexperienced breeder, however, the more conservative rule is recommended.

as early as August, and some as late as March and April. These are exceptional animals, however. With our excellent conditions for feeding and housing goats, careful selection from does of out season breeding habits might well result in time in an appreciable lengthening of our breeding season, which would be a valuable asset to the industry.

Some goatlings, as soon as the season begins, appear to be in heat practically all of the time. They, moreover, act toward the other does in heat as if they were bucks. These actions may indicate that the doe is suffering from inflammation of the ovaries, or other organic disturbance, and it may be profitable to consult a good veterinarian in her behalf. It may also be that the doe is sterile, that is, deficient in some of the female organs, and so will never breed. But do not condemn such a doe to death until she has been well tested. It is better to test her at once, her first season, and not wait for her second year.

There are occasionally goatlings who make no sign of heat whatever, except a slight reddening of the vulva. Such a doe must be watched carefully when it is desired to breed her, and perhaps should be taken daily to the buck, if no indication at all appears. These does are perfectly normal in every way, but are somewhat of a problem at breeding time.

Premature Lactation.—One more point will complete the discussion of the goatling and her needs. In our very highly bred milk strains, the goatling at twelve or thirteen months of age, sometimes earlier, will make an udder, although she has never been bred. This is

FIG. 49.—Triplet Saanen does age four months owned by Dr. J. W. Henderson, of Berkeley, Calif. Echo Mabette (right) has already formed a perfect udder, well filled with milk.

especially likely to happen when she is born in the early spring, and the next spring, having been well fed and being in the best of condition, is turned out to lush pasture. These little premature udders must be carefully watched. Usually they need no care, and disappear with the coming of fall and dry feed. Sometimes, however,

they become so full of milk that they are painful, and if not relieved the little doe may start the disastrous habit of self sucking. In such a case the goatling should go at once into the milk band and be milked with the same care and regularity as the older does. She may develop an astonishing flow of milk, or it may remain somewhat meager, but, if milked at all, she should be milked regularly and thoroughly. Her milk is perfectly normal and after the first few milkings is as good to use as any milk. She suffers no harm from this premature lactation; on the contrary, such a doe is likely to develop into a milker of outstanding excellence. After she has been bred the milk flow soon ceases.

The Pregnant Doe.—For the first ten weeks after breeding the doe needs no special attention. If it is her first breeding she will probably stay on with the goatlings for that period. If she is in the milk band her flow continues for at least that long, and her care is no different from that of the other milkers. After ten weeks have passed, some steps must be taken to dry her off if she has not gone dry of her own accord. As soon as possible omit the evening milking, but in the morning milk her out clean. After a week or so milk only every other morning, until the flow has ceased entirely. It is not the best dairy practice to take only part of the milk and leave the rest. This certainly results in a rapid diminu-

tion of the flow, but is thought to encourage in an animal the habit of " holding up " part of her milk. The drying off process is best accomplished by lengthening the period between milkings, but stripping the doe clean when she is milked.

The feed rations for the dry doe in kid are indicated in Chapter XIV. If confined to the corral the doe will take little exercise. This is perhaps the chief objection to the system of stall feeding milk goats, for moderate exercise at this time is of the greatest benefit, both to the doe and the oncoming kids. On the other hand, the range doe must be carefully guarded against overfatigue, and, above all, from the precipitate headlong running to which herds of goats are prone. The ideal conditions for the pregnant doe in her later months are: the daily exercise of ranging a moderate distance, and the care of a wideawake herder and efficient, well trained dogs, who know how to forestall and prevent panic and stampede. Remember that this is no wild doe, who cheerfully travels miles and miles up to the very day of kidding. In the first place, your milk goat this year was subjected to the drain upon her system of giving milk ten months, the wild goat only three. Your milk goat is bearing two, very likely three, kids, whose weight will aggregate 18 to 22 pounds—the wild goat one, or possibly two kids, very much smaller and lighter. Do

not, then, expect your doe to perform the feats of travel accomplished by the goat in " natural " conditions.

During the last two months of pregnancy each doe should have, if possible, a separate stall, where she is free from molestation. Above all, every precaution should be taken to avoid the chance of blows, of jamming in small passageways, and of any kind of sudden fright. At this time the presence of any horns in the herd will prove themselves suddenly the ugly menace that they are, adding immensely to the anxiety of the breeder and his risk of loss.

Abortion.—For all of the dangers listed above lead to the one tragic result, abortion. Abortion means not only the loss of the kids—it often means the death of the doe herself, and in nearly every case her great suffering and loss of milk. If, however, in spite of all precautions it happens, the breeder may want some suggestions as to the best way of dealing with his misfortune.

Treatment.—We are discussing at present abortion caused by accident, not disease. The first indication that something is wrong will be a bloody discharge, or a string of mucus from the vulva. Nothing can be done to help the situation except to make the doe as comfortable as possible in a loose stall. The ejection of the fœtus may be very slow, taking much longer than in a normal birth. The after-birth is more likely to be re-

tained (see page 165). After the expulsion of the fœtus and placenta, the doe will need more care and nursing than after a normal birth. Abortion is a great shock to the system of an animal, and she recovers slowly. If any udder at all has formed, she should be milked patiently and regularly, even if there is very little yield. It is possible that as the doe recovers her strength her yield will increase, so that the loss from her misfortune will not in this respect be so great. It is probably always best to hold the doe for several months before breeding again, until she gives every indication of being once more in normal condition, with a good appetite, good, smooth coat, bright eyes, and a substantial amount of flesh on her body. It is a temptation to make good the loss from abortion by breeding the doe again at the first opportunity offered. This, however, is a mistaken policy, leading to the further weakening of the animal and the likelihood that her misfortune will be repeated.

Period of Gestation.—The normal period of gestation is usually said to be 150 days. It not infrequently is less than this by several days, the normal birth of vigorous kids occurring at 146 or 147 days. With the large Swiss goats, however, it occurs even more frequently that birth is delayed to 152 or 154 days. The normal signs that a doe is about to drop her kids are: a sudden filling and stiffening of the udder, restlessness,

pawing, and at last the appearance of a string of mucus from the vulva. All should now be in readiness for the coming of the kids.

Care of the Kidding Doe.—Suggestion has already been made as to the bedding of the kidding pen. Whatever material is used, it must be abundant and clean. The doe must be loose, never tied. The pen should be reasonably large for the comfort of the doe and her caretaker. It is probable that among our milk goats, with their warm affection for their owners, the business of kidding actually gets on more quickly and more comfortably if the caretaker is at hand than if the doe is left alone. Most does certainly behave as though they appreciated and wanted your presence at this time. Usually no assistance is required.

The normal presentation is front feet first, nose between the feet. Once this much of the coming kid is visible no further anxiety need be felt. The birth, even if sometimes a little slow, will be achieved without trouble. Occasionally the hind feet come first. Such a birth is likely to be slow. It can be assisted safely by pulling a little, outward and downward, on the hind legs of the kid, pulling only at the time of the doe's own efforts at expulsion. More rarely one forefoot will be doubled back. This is usually of no consequence. More rarely still the head will be doubled back over the

shoulder, preventing the birth. In this case it is necessary to push back gently on the legs and body of the kid, insert the hand, and bring the head around into position. Sometimes there will be a dead kid along with one or two live ones. The body of a dead kid seems to come with more difficulty than a live kid, and help may be necessary to the doe in her efforts to expel it.

A healthy doe who has had proper feed and exercise so rarely has any trouble in kidding that the veriest novice need feel no anxiety at all. On the extremely rare occasions when the birth is completely obstructed, and after many hours of labor pains the doe is exhausted, the assistance of a veterinarian must be obtained.

Usually the first kid will be dropped about an hour after definite pains have begun, and the second and third kid, if so many, will appear at intervals of about fifteen minutes. The birth of the first kid, however, sometimes occurs within a few minutes of the time that one notices the doe is down, and the others come almost nose to tail. On other occasions the birth-pains may continue at intervals for four or five hours before the kid is dropped, and as many hours will elapse again before the second kid comes. This is rather unusual, and for the most part the kidding is a quick and simple business. If after the birth of the first kid a considerable part of the afterbirth appears, one may conclude that there are no more

kids to come. This, however, does not always hold true. The afterbirth should come away clean in the course of a few hours. Some does are inclined to eat it. It is the best veterinary opinion that nothing is gained by permitting the doe to do so. On the contrary, it sometimes lies in the stomach undigested for a considerable length of time. The doe should not under any circumstances be allowed to eat it, and it should be cleaned away at once.

As soon as the kids have arrived the doe should have a bucketful of clean, warm water, almost hot, and a generous bran mash, also quite hot, and not too wet. Then she should be milked out promptly and very thoroughly. The pen should be cleaned, fresh bedding put down, and fresh hay in her feed box. Everything has now been done for her that is necessary. One point only need be emphasized. She must not be left alone. If her kids have been removed she should have in the pen with her or an adjoining pen another goat that she likes, and to whose companionship she is accustomed. This is not a matter of sentiment. It is a plain matter of quarts and pints. If she is left alone to cry and fret these first hours after freshening, she will never develop the yield of milk that she might have produced had she been more contented at that time.

If there is no other goat to put with her, and it is desired to raise the kids by hand, the best device is to

put the kids in a narrow, deep box and leave them with the mother. She will have the satisfaction of licking them and will not fret, while the kids cannot reach her udder to nurse. After a few days of this arrangement, milking the doe carefully by hand and feeding the kids on a bottle, the kids will learn to wait for the bottle and will not nurse even when turned loose in the pen with the mother. Or, if desired, the mother could be put into the kind of a coat described on page 200 to prevent the kids from nursing.

The afterbirth, which ought normally to be ejected a few hours after the kidding, sometimes does not come away for several days. If after one day the doe seems out of condition and there is an unpleasant odor noticeable, a veterinarian should be called. Sometimes the retained afterbirth can be loosened by the use, two or three times a day, of a vaginal douche of normal salt solution, quite warm (one teaspoonful salt to one pint water). Extreme care and gentleness should be used in passing the vaginal tube of the syringe through the neck of the uterus. If that has already contracted too much to allow passage, very little can be accomplished except by a veterinarian.

Normally there is a slight bloody discharge for a week, or even two weeks, after kidding. It is pleasanter for all concerned if the doe can be kept clean, washing

the portions of the body around the tail with warm water and a mild antiseptic, and drying it carefully. In any case, it is not only pleasanter, but it is imperative that the coat of long haired does be carefully trimmed before they kid, so that there is no long hair on the shanks or stomach or around the udder to accumulate dirt and so contaminate the milk.

The doe who has just kidded should be kept in her pen, quiet and warm, for three or four days. She should have no grain or green feed, but plenty of good hay, a warm bran mash night and morning, and two or three times a day a drink of very warm water.

Care of the Fresh Doe.—To obtain the best results from the fresh doe the same precautions as to exercise must be observed that were suggested for the pregnant doe. She must not be exposed to overfatigue from long travel, nor must she be permitted to run.

"But," one may say, "in a state of nature a goat travels miles each day without fatigue, and leaping and running are natural to her as well." True. But it will be remembered that Mother Nature's goat dried up three months after her kids were born! The food a doe eats is the only source of her energy and of her milk production as well. She cannot use it as fuel for extended locomotion and at the same time use it to manufacture milk. As for leaping and running, only once to watch

the pitiful sight of a well bred, heavy doe running wildly, her great bag flopping from side to side, sprinkling the dust with its milk, would silence forever the remark that it is " natural " for goats to leap and run. Not for our dairy goats in full milk!

Methods of Feeding.—There are some authorities on the care of goats, notably M. Crepin, the eminent French writer, who go to the other extreme and insist that a goat only attains her best yield when she is kept closely tied in a stall day and night throughout her period of lactation, and is fed a forcing ration for heavy production.

Our American methods very sensibly choose a middle course in the management of the milking doe. If she goes out for her feed on range or pasture, she goes in the care of a watchful herder, a moderate distance only, and always at a slow, easy pace. M. Crepin gives us the outstanding figures for the yield of his stall imprisoned goats. These figures are constantly being surpassed in our records by does that have the freedom of pasture and range. Certainly if one remembers that the doe is not only a milk factory but also the mother of valuable kids we will be the less trustful of the too highly artificial regime insisted upon by M. Crepin. Such prolonged confinement could not but prove detrimental to

the health and constitution of the goat and of her kids.*

Pasturing.—The moderate exercise of pasturing maintains her health, vigor, and freedom from disease, the very qualities we value most highly in her. It also by the variety offered maintains her appetite, her capacity, and her powers of digestion and assimilation. Thus, if the travel is moderate, range and pasture feeding add more to the productive capacity of the doe than it subtracts for the needs of locomotion. This range and pasture feed must, of course, be supplemented by stall feeding according to varying conditions, as will be indicated in the chapter on feeding.

Staking.—If there is no pasture or range available staking the doe on good feed is the next best method of offering her some freedom of movement and some variety of diet. A long stake rope, well provided with swivels, the stake driven in close to the ground, will make a fair substitute for range if the stake is frequently shifted. A doe will not eat where she has walked the day before. This must be remembered by the herder also. If finally there is not even space for staking the doe, and she must

* This opinion of the author appears to be entirely refuted by an article appearing in the Goat Journal, January, 1921, page 35, by Dr. C. P. DeLangle. In this article well supported evidence is offered in proof of the fact that goats do well and maintain unbroken health for generations under the conditions described by M. Crepin. Doctor DeLangle's sources of information are official, taken from the records of government inspection statistics both in France and Belgium.

In spite of this splendid tribute to the hardihood of the goat, she still no doubt has everything to gain from the comparative freedom she enjoys in her American home.

be entirely stall fed, her corral should be as large as possible, on a steep hillside if one is available, and if not it should be provided with some kind of a pyramid of stones or board that will give the doe a chance to climb a little, and so use her muscles.

Care of the Udder.—*Housing.*—To reach her best production, a fresh doe should be warmly housed in damp or cold weather. She must be kept well bedded on a dry floor in a pen free from draughts. To permit the fresh doe to lie outside, on cold or damp ground, is to invite that grimmest ill that threatens the heavy milking doe, caked udder. The udder must be watched for other slight ills—scratches, small cuts, and chap. The former may lead to infection. When such small abrasions are observed, the udder should be washed with warm water and a disinfectant, and be well greased with carbolated vaseline. Vaseline should be applied when a tendency to chap is noticed. Absolute regularity in milking, and "clean" milking, *i.e.*, stripping out the last drop of milk from the udder, are both essential to heavy production well prolonged. A doe nursing her kids should be carefully stripped twice a day if she is giving more than her kids consume.

The practice of offering a milking doe very warm water is also valuable in maintaining the flow of milk. Goats are noted for the small amount of water that they

seem to require. But that is in a "state of nature"! For heavy production every effort must be made to induce the doe to drink, and the fact is well established among goat keepers that the doe will consume large amounts of warm, even hot, water, when she would entirely refuse it cold. The water and the bucket must be perfectly clean.

The "Self-sucker."—The fresh doe, especially if it is her first kidding, must be watched for any indication that she is sucking herself. This disastrous habit may be started by a feeling of discomfort from too much milk in the newly formed udder. In such cases the doe should be milked three times a day until her udder capacity has developed to correspond with her flow of milk. Whatever the cause of the habit, it can be broken up most humanely and efficiently by the use of the coat described on page 200. After she has worn this coat a few weeks, if it is removed the doe will probably never revert to the habit of self sucking, especially if the udder is watched and undue discomfort is prevented.

These are the general points to be observed in the care of a milking doe: moderate exercise, varied diet, warm, dry housing, care of her udder, regularity in handling her, and a regular supply of warm water.

Learning to Milk.—It may happen that someone will find himself in possession of a goat when he has had no experience in milking, and has no one to teach him.

Although the process can be learned only from actual practice, some suggestions may be helpful to such a beginner.

It would be best to learn on a doe going dry, rather than on one just fresh. If the latter is the only animal available, keep one of her kids, who will finish the job completely if you fail to do so. Use a rather large, high pail, one whose edge is not easily reached by the doe's foot. Sit with the right side next to the right side of the doe, the shoulder pressed against the doe's shoulder. Grasp the teats, thumbs outside the fingers, close the grasp, beginning at the top (thumb and index finger), and successively close the other fingers, thus forcing the milk down the teat and out. Do not try to take too much of the udder in the grasp if the teat is short. In that case, use at first only the thumb and the first two fingers. As the bag empties, it can be grasped with the whole hand. Milk firmly but gently until the milk ceases to flow, then strip the teat with the end of the thumb and first finger, occasionally " nudging " the bag gently with the closed fist until the last drop is extracted. Do not try to learn with one hand alone, holding the pail in the other. Use both hands from the beginning, keeping them firmly on the teats, no matter how much the doe attempts to step around or to lift her foot. She will use her right hind foot. Defend the milk pail from this foot by throwing

out the left wrist to catch it and ward it off, but *do not let go the teats.*

Foreigners often milk goats from the rear. It seems more natural to most Americans, as well as cleaner, to milk from the side, as we do cows. Arrangements for comfortable milking are illustrated in Chapter XVII.

Developing a Heavy Milker.—While we have now reviewed the main points of good dairy practice in the management of milking does, there are a number of suggestions that may be helpful to one who sets out to develop a milker of outstanding capacity.

Early Care.—To "begin at the beginning," choose a kid that is born in the spring. For no reason that is explainable, spring kids make a better growth and development, other things being equal, than kids born later in the season. Having chosen such a kid, from the best available milk stock, rear her in accordance with the suggestions given for the care of the kids and the goatlings. Breed her at the age of eighteen or nineteen months, so that she will freshen at two years old, and in the early spring. If her feed is to consist at all of range or pasturage, it is important that she come fresh just as the new spring growth is beginning, so that the development and increase of her milk flow will correspond with the increase of the green feed.

During the goatling stage and her pregnancy take

pains to preserve with her that affectionate intimacy which grows up between the hand fed kid and its caretaker, but which is sometimes lost during the next stage when no special need for individual attention exists. A few moments of petting or handling each day will retain in the young doe her feeling of affectionate confidence in her owner, and will be rewarded later, when she comes a fresh doe into the milking room.

Removing the Kids.—Before the time of kidding arrives, the decision *must* be made to separate the kids from the doe before she has an opportunity to see, hear, or smell them. If we are to develop the best possible capacity in the doe, there is no questioning this necessity.

* For the young does, especially of the Swiss breeds, develop very rapidly a passionate attachment for their kids. When they are finally removed, the mother's suffering is prolonged and intense, enough in itself to check the development of her milk, whose free and full flow is directly dependent upon the contentment and placidity of the animal. More than this, she will deliberately hold up her milk, keeping it in the hope of the return of her kids, and this, too, acts to decrease permanently the flow she was giving when her mind was at peace. But worst of all, in the case of a young doe the caretaker now has on hand the task of " breaking " her to milk. In her excited and unhappy state of mind this process is likely to

* Reproduced from the "Goat World," November, 1918, page 5.

become all that its name implies of miserable conflict and final subjugation of the poor little doe. Although superior strength and patience win at last, a doe that has had to be " broken " to milk never in all her life becomes such a quiet and steady goat at the milk pail as one who has had a happier experience. The " broken " doe is likely to be marked for all time by more or less nervousness that must keep her milker always on the alert.

It is clear, then, that if we are to make the most of our doe we must not subject her to this trying experience. We must rather accept the alternative of removing her kids at the moment of birth. This involves the necessity of being at hand for their arrival, even if one is obliged to make a night vigil of it. Loss of time and of sleep is rewarded by the subsequent ease of handling the doe and her gratifying development.

The First Milking.—Having made this decision, as each kid arrives wrap it in a clean sack and pass it to an assistant who will care for it in the house. Now let the doe lick your hands, which have been handling the kids, and she will from that moment transfer to you the mother love she was prepared to lavish upon her kids. When the birth is over, the pen tidied up, and the doe has been given her mash and hot water, approach her with the milk pail. Do not tie her or put her in a stanchion or confine her in any way. Leave her free in her pen. Let her lick your hands again, and put them

on the udder gently and begin to milk. After a few sniffs at your neck, and some motherly murmurs of affection, the doe will bring up a cud, spread out her hind legs, and will contemplate with great satisfaction the process by which you extract the last drop of milk from her udder. No business of "breaking" this doe!

Fig. 50.—A young Toggenburg "owning" her milker. This doe never saw her own kids, but she has for her milker all the affection she would have given her kids.

When it seems there is no milk left, rub the udder gently with a little warm oil and try again. When you are sure that the bag is finally empty, leave your doe as we have suggested in the previous chapter, with a companion, warm, clean, and in comfort. For the first few days continue to milk her in her open pen. When she is

ready to go into the milking room, to the stanchions, or the bench, and is given her feed at milking time along with the rest of the does, be sure to release her head when it comes her time to be milked, so that she can lick you and sniff you a little, thus "owning" you as she would "own" her kids before letting them nurse. This

FIG. 51.—A Nubian doe "owning" her kid. (Courtesy Widemann Goat Milk Co.)

preliminary completed, she will bring up her cud and stand quietly to be milked. If the best results are to be obtained, an effort should be made to see that the doe is always milked by the same person. If, however, it is occasionally necessary to shift, the doe thus trained to stand will be more quiet and steady even with a stranger than one who has been forcibly "broken."

Tender Udders.—The only exception to this good behavior that is likely to occur will be in the case of a young doe whose milk flow increases more rapidly than the capacity of her udder. In twelve hours the udder will fill so full and hard that it hurts her to be touched. Such a doe should be milked early in the morning, at midday, and late in the evening, until her udder capacity develops. Many goat keepers believe that the milk flow in any case is increased by three milkings in twenty-four hours instead of two. Certainly no harm results from such a schedule, and in some cases it is necessary.

A Good Yield.—Do not be discouraged if your doe comes in with a tiny udder and only a pint or so of milk the first time. From such small beginnings very heavy milkers have been known to develop. A satisfactory yield for a doe in her first kidding would be four pounds a day the first week, gradually increasing to six pounds by the second or third month. Anything above six pounds may be considered exceptionally good.

Long Lactation.—Another point should be borne in mind if one is to develop the utmost capacity of a young doe. Prolong the first period of lactation as far as possible. Do not breed the doe again in less than seven months after kidding, and milk her regularly and carefully even if she should be giving so little that the milk itself does not repay the trouble. This will tend to establish a long habit of lactation, while on the other

hand, if the doe is allowed to go dry as soon as her flow is no longer abundant, this will tend to confirm a brief period of lactation. But, of course, she should be dried off when she is within two months of kidding.

If these special suggestions are followed, together with the general advice given on the care of the milking doe, and if the rations are abundant and suitable, as indicated in the following chapter, one will have every advantage in developing a doe of outstanding capacity. Granting a good inheritance these methods will not fail to bring their reward in a record to which one may point with pride and delight.

The "Capricious" Doe.—But with all our careful rules and method, there is still one thing that all goat keepers must bear steadily in mind. It is the significance of the English word "capricious," which is derived from the Latin, "capra," a goat.

In the use of our language, to what sorts of things is this word most usually applied? To the wind that bloweth where it listeth, to the whims of Our Lady Fortune, to music, to the play of little children, to all kinds of gay and sweet and lovely things, but all alike in this one respect, that they cannot be subjugated or brought under the control of our human wills. And all of these things—lovely, desirable, elusive—what do we mean when we call them "capricious"? We mean, the word

means, like a little goat. A little goat, that of all God's creatures is the gayest, the loveliest, the most serviceable to man. Only we must remember that we cannot hope to subjugate her, or bring her under rule and rote as we can the more placid cow. But, unlike the cow, we can control her through her quick and ardent affections. If we are willing to preserve the loving relationship she is eager to establish with us, and to watch and understand her varying moods, then we shall find we have in our little goat, " capricious " though she may be, the sweetest, gayest and most amusing companion in all the world, and the most efficient partner of our pocketbook.†

QUESTIONS

1. What is meant by the term " goatling "?
2. Discuss the care of the goatling.
3. When is the goatling old enough to breed?
4. What are the indications of heat in a doe?
5. When are does usually in season? How often?
6. Describe the method of caring for premature lactation in a goatling.
7. What special care should be given the pregnant doe?
8. State the dangers resulting from abortion. Discuss the treatment of abortion.
9. What is the gestation period in a goat?
10. Discuss the treatment to be given a kidding doe.
11. How do American methods of feeding the doe differ from those advocated by M. Crepin, the eminent French writer?
12. What special care should the doe's udder receive?
13. What causes a doe to become a " self sucker " and what is the remedy for this condition?
14. How would you learn to milk a goat?
15. Give several suggestions that would be helpful in developing a heavy milker.

† Reproduced from the " Goat World," November, 1918, page 5.

CHAPTER XIV

THE THEORY AND PRACTICE OF PROPER FEEDING

Balanced Rations.—What is meant by balanced rations? It is not within the scope of a single chapter to discuss the varied and important problems involved in the subject of food values and their proper ratios for different purposes. The goat-breeder, if untrained along this line, is recommended to obtain a standard book that deals with the subject, and to give it careful study. One of the best is "Feeds and Feeding," by Henry and Morrison. Meanwhile, in case someone finds himself in possession of a goat, and has no idea at all what to feed her, some very simple and superficial explanations of the theory of feeding may be offered, together with suggestions for carrying them out in practice.

The principal constituents of all feed stuffs are classed in two main groups, proteins and carbohydrates. Both these two food elements, or nutrients, exist in every form of feed, but in different proportion to each other in different articles. This proportion is indicated as a ratio, called the "nutritive ratio." For example, the nutritive ratio of alfalfa hay is 1: 4.3, which means that in any given quantity of alfalfa hay there is one pound of pro-

tein to every 4.3 pounds of carbohydrates. Again, the ratio for corn is 1: 10.4, that is, one pound of protein to every 10.4 pounds of carbohydrates. All books on this subject carry tables giving the constituents of the common feed stuffs and the nutritive ratio for each.

Now standards of feeding have been established that indicate for different kinds of animals the right proportion or ratio in their diet of proteins and carbohydrates. For instance, the right ratio for a milking animal is about one pound of protein for every 5.7 pounds of carbohydrates, or 1: 5.7. For a young, growing animal, 1: 4.5; for a working horse, 1: 7, etc. The total amount of food is determined by the body weight, the rate of growth, the amount of milk produced, etc.

A study of these tables, and an endeavor to apply them to one's own feeding problems is the most valuable method possible for producing the best results from the smallest possible expenditure for feed. But even without this exact study and data, there are some general principles which everyone should bear in mind, and which no one can safely violate.

For a Milking Doe.—For instance, the proper ration for a milking animal, as we have said, is 1: 5.7. Say you are feeding her alfalfa hay, whose ratio is 1: 4.3. In order to bring up the proportion of carbohydrates, which is too low for her in alfalfa alone, you should look for

some grain which is too high, *i.e.*, higher than 1: 5.7, to supplement the alfalfa. Barley you find is 1: 8. If, then, you feed your doe alfalfa hay, 1: 4.3, and rolled barley, 1: 8, you will get a combination which strikes somewhere near the proper ratio of 1: 5.7. But if you feed her oat hay, which is 1: 8, and for grain feed her barley, 1: 8, and for green stuff you give her carrots, 1: 10, it is plain that her diet will be far too high in carbohydrates, she will put on fat, but will fall off in production. Or one might feed her alfalfa hay, 1: 4.3, and oil cake meal, 1: 1, and bran, 1: 4—all excellent feeds, but all too high in protein, and deficient in carbohydrates. Your doe in this case would probably in time get sick, and again fall off in milk, although in themselves all these feeds are good and useful for milk production.

Therefore, even if one pretends to no scientific knowledge of balanced rations, it is not safe to remain in ignorance of the food values of the feeds he uses, lest he pile up the diet too exclusively on one side or the other, and thus endanger the health and productivity of his animals.

With these general principles in mind, we may consider the different kinds of feed that are available for our goats.

Green or Succulent Feed.—*Pasture.*—Under this head first of all comes good pasturage or range, with a

variety of grass, weeds and brush. No instruction need be offered for the use of this feed. If there is variety enough, the doe will balance her own rations with a sure instinct. A word may be needed, however, in regard to poisonous plants on the pasture or range. Goats appear to have an unusual sagacity concerning harmful plants. In a well fed herd, whose range contains an abundance of wholesome feed, and whose hay racks and grain pens at home are reasonably well supplied, in such a herd there will be little danger from poisonous plants. Only prolonged scarcity and hunger will drive them to eat what their instinct teaches them to avoid.

Another question sometimes comes up in regard to pasturage. How many goats can an acre support? Many factors, of course, enter into this question, but one may make a few general statements in reply. If the conditions of our eastern United States are in mind, where the doe is housed and stall fed six months of the year, and the pasture is used only the remaining six months, one may figure on two goats to the acre, provided it is good pasture, renewed by summer rains. If, on the other hand, the range conditions of our western states, especially California, are to be considered, where the herd goes out almost every day of the year, and where the feed becomes rather dry and scarce during the long summer drought, it is safer to figure on two acres to one goat.

Range.—One more point must be borne in mind in connection with range feeding for milk goats. In the past years Angora goats have made a very good reputation for themselves as "brushers"; that is, for their ability to subsist on brush, so supporting themselves on an otherwise waste product and at the same time clearing the land and preparing it for cultivation. Many persons are under the illusion that milk goats will serve the same purpose. They will, as far as subsisting on brush is concerned, and clearing the land. But they will not give milk on this diet. They may thrive themselves, but their productivity ceases. Any range that is to be useful for milk production must contain grass and succulent weeds as well as brush. If nothing other than brush is available it is still useful to a herd of milk goats, providing very good feed for the youngsters and for the dry does, and exercise and healthful variety for the milking does. But for the latter it must be generously supplemented at home by a true milk producing diet.

A Fence or a Herder.—The question sometimes arises in connection with range feed for goats, which is better, to fence the range and turn the goats loose, or to send them out with a herder? By all means the latter, if possible. Aside from the dangers from predatory animals, and the danger from sudden fright and running, our gentle and affectionate pure bred milk goats do not

take kindly to wandering off by themselves. They linger around near the home, and do not make the best use of the feed at their disposal. A watchful herder who goes before them, breaking new trails, varying the route each day and tempting their appetite with variety will get twice or thrice the food from a given range that the goats will obtain if left to themselves.

Cultivated Crops.—The next source of succulent feed will be from planted crops, of which a portion is cut each day and fed in the mangers, green and fresh. Such crops should be planted having in mind the nutritive ratio of the principal hay to be used. If alfalfa hay is to be used, with its high proportion of protein, plant pumpkins, corn, or any of the sorgums, all of which, and others as well, have a high ratio of carbohydrates. If oat hay is the main dependence, plant vetch, kale, field peas, soy beans or clover. All of these are high in protein, and balance the high ratio of carbohydrates in oat hay.

For the winter months, when fresh feed can no longer be cut in the field or garden, there are two sources of succulent feed, a storehouse of roots, such as beets, mangels and carrots, and a silo. All the roots suitable for storage are greatly relished by the goats if fed clean and partly cut up, and they are the greatest possible aid to maintain the milk flow. But all are definitely on the carbohydrate side, and must be used to supplement

clover or alfalfa hay rather than oat hay. If the herd is large enough to support a silo, it must be observed that the crops most usually planted for the purpose of ensilage are again on the carbohydrate side—corn, the sorguns, etc.—so that again this form of succulent feed is most useful to supplement alfalfa or clover hay.

Hay.—Under this head comes the principal item of diet for the dairy goat. No matter how good the pasture or the range, hay is an essential portion of the dairy rations, and no goat keeper can safely neglect its importance. Two or three points must be noted in regard to its use. Goats are of all animals the most wasteful of hay. They love to pull it from the feed boxes or racks and scatter it on the floor, and once it has fallen nothing will induce them to touch it again. For this reason the inexperienced goat keeper is recommended to adopt the type of feed box suggested and illustrated in Chapter XVII, which has proved successful in preventing this costly waste. Second, goats greatly prefer a fine stalked hay, whether clover, alfalfa or grain hay. They clean this up so much better than hay of a coarser sort that it pays very well to obtain this sort if it is to be had in the market. Last, do not forget that your doe is capricious, and, when laying in your stock for the winter, provide if possible more than one kind of hay. She will eat more of it, waste less, and will produce more milk for you if you thus humor her native love of variety.

Concentrates.—Under this head come the different grains, corn, oats and barley, and the various factory by-products, of which wheat bran, middlings, linseed, cottonseed, cocoanut meal and dried beet pulp are probably the most commonly used by dairymen. Each must be studied and according to its feed value must be used to supplement the other two main items of diet, the succulent feed and the hay. What was said above in regard to the hay applies equally well to the concentrates and the succulent feeds—the more variety the better. A little effort and thought expended in obtaining this variety, and in maintaining at all times a reasonable balance in the ration, will be amply rewarded by obtaining a higher rate of growth and productivity in return for a smaller amount of food. Remember that your goats—bucks, kids, goatlings, and does—are all alike capricious. Curiosity and love of variety play a larger part in influencing their appetite, their capacity, and their assimilation than does the mere urge of daily hunger, and you will get "more for your money" if you bear this steadily in mind.

Quantities to Feed.—So far no mention has been made of quantities to feed. Some general rules may be laid down, but in the end the only safe guide to follow is one's own close observation of his animals.

In the pasture or on range the goats, of course, take

all they want, or at least all they can get. If green stuff is cut and fed to them in the feed box, or if roots or ensilage are used, a rough estimate of the quantity to be fed daily would be about six pounds for every one hundred pounds of body weight. This succulent feed is of the greatest importance to all the herd. It maintains the rapid and healthy growth of the young, and keeps the bucks in prime condition and vigor. But it is even more essential to the milking doe, and to the full development of her capacity. No outstanding record can be expected from any doe who has had only dry feed during her period of lactation.

Hay supplements the succulent feed in providing bulk to the ration. Again, a rough estimate of the quantity needed would be two pounds daily to every one hundred pounds of body weight. A better rule would be, watch your animals and give them all the hay they will clean up in a reasonable time, say, in three or four hours twice a day. If their pasturage or other green feed is abundant and nutritious, they will need very little hay, perhaps at times none at all. If the pasturage is very immature and " soft " they will need considerable hay, preferably grain hay, to supplement the lush grass. Again when the pasturage becomes scant they will need and will consume more hay. Give them good, clean, fresh hay, in boxes arranged so that they cannot waste it,

twice a day, and let observation and experience guide you as to the amount needed. The only rule is, give the animal all the hay it will eat.

With concentrates the case is quite different. These rich feeds must be dealt out with caution, yet with sufficient generosity to ensure the desired results. For kids, goatlings, and bucks, the estimate would be one pound for every hundred pounds body weight. The same for a doe giving milk at the rate, say, of two quarts a day. Add to this grain ration a little. If the milk increases, continue to add, until further increase of the grain ration produces no further increase of the milk yield. Two pounds a day of concentrates, with abundant good hay and succulent feed, is probably the outside limit needed even by a very heavy-producing doe.

Feeding Summary.—To sum up these general suggestions for feeding goats, we offer to the consideration of the goat keeper the old adage which Henry and Morrison adopt as the motto of their scientific volume on feeding:

" The eye of the Master fattens his cattle."

No science, no formulæ, however exhaustive, can replace in the dairy herd that wisdom which springs only from constant thoughtful observation of the individual animals and their needs, a wisdom which finds its reward

in the sleek bodies and shining eyes of the herd, in the proud records of the milk sheet, and in the substantial balance of the bank account.

Feeding Programs.—By way of suggestion we add a few typical feeding programs, to be used only until the goat keeper has acquired the data and experience to construct his own.

For kids, one month to four months old:

1. Green vetch and oats, planted together, cut and fed fresh, once a day, all they will clean up. Brush and tree twigs, once a day.

2. Oat hay and alfalfa hay (or clover), each fed once a day, as much as they will clean up.

3. Grain mixture, one part bran, one part oil cake meal, two parts rolled barley. Feed twice a day, one-quarter pound apiece at a feed.

For goatlings and young bucks:

1. Same as above.

2. Same as above.

3. Same grain mixture, but fed only once a day, one pound apiece.

For buck, at heavy service, or building up after heavy service:

1 and 2. Same as above.

3. A.M. Feed grain mixture of equal parts bran, middlings, and dried beet pulp; total amount, one pound, made into a mash, quite hot, not too wet.

P.M. One pound rolled barley.

For bucks at rest, in good condition:

1. Same as above.

2. Oat hay only one day, alfalfa the other day, all that is consumed.

3. Bran only, one feed, one pound, hot mash. Alternate day, rolled barley, once only, one-half pound.

For dry doe, latter part of the period of pregnancy:

1. Same as above.

2. Oat hay, fed twice a day, an occasional feed of alfalfa hay for variety.

3. Bran only, once a day, one pound, hot mash. No grain, beet pulp, oil cake or any other rich or fat-producing food.

For fresh doe:

First week—

1. Small amounts of green feed or roots, not more than three pounds, gradually increased.

2. Same as above.

3. Bran, one pound, hot mash, night and morning.

Second week—

1. Gradually increase the supply of green feed to the full capacity of the doe. If sent out to pasture, leave out only half a day at first. Do not send out a fresh doe to green grass when she is hungry or she will bloat. Feed hay first.

2. Oat hay in the morning, alfalfa at night, all that is consumed.

3. One pound bran in the morning, hot mash, one-half pound rolled barley in the evening. Increase the grain ration in accordance with the increase of her production.

In the University of California Bulletin on Milch Goats, No. 285, page 102, the following grain mixtures are recommended:

I

	Parts by weight
Rolled barley	1
Wheat bran	1
Dried beet pulp	1
Cocoanut meal	1

II

Dried beet pulp	6
Rolled barley	1
Wheat bran	1
Cocoanut meal	2

III

	Parts by weight
Dried beet pulp	1
Wheat bran	1
Oats	1
Cocoanut meal	1

IV

Dried beet pulp	3
Rolled barley	1
Wheat bran	1

The quantity to be fed of these mixtures is not indicated, but would be determined according to the general principles outlined above. Cocoanut meal is an ingredient in three of these mixtures. It is the experience of most goat keepers that goats dislike this feed, and, if it is to be used, patience is required to coax the goats to eat it.

It will be noted that each of these mixtures forms in itself a balanced ration, so can safely be fed day after day exclusively, if so desired. This is in accordance with

good dairy practice, and no doubt has much to recommend it. It is the opinion of the writer, however, that it is better in dealing with goats to take advantage of their love of variety and to balance the rations by means of the various feeds offered at each feeding time, rather than to adopt a perfectly balanced feed and to use it repeatedly. For example, if oat hay is used in the morning, with a bran mash, and alfalfa hay is fed at night with rolled barley, at each feeding time the hay and the grain together form a good balance, and an entire variety is offered. This probably appeals more to the goat than a single balanced feed fed repeatedly.

QUESTIONS

1. What is meant by a balanced ration? Illustrate.
2. Describe the value of pasture and range for feeding goats.
3. Which is the best practice, to fence the range and turn the goats loose, or to send them out with a herder? Why is your suggestion best?
4. What are the points in favor of succulent feeds?
5. What succulent feeds are used successfully for goats?
6. Name three points to be considered in using hay for goats.
7. Name at least six concentrates used in feeding milk goats.
8. Give the approximate amounts of dry roughage, succulent feeds, pasture, concentrates eaten by a good doe during the year.

CHAPTER XV

STOCK SHOWS AND MILK RECORDS

In an earlier chapter of this book, speaking of the sale of stock, the following statement is made: ". . . A breeder . . . must regularly exhibit his animals in live stock shows, and must be prepared to offer orderly and well authenticated records for the milk yield of his does." At this point, when we have completed the discussion of the general care of goats, it may be well to add some detailed discussion on these two points, exhibiting and record keeping.

Conditioning Goats for Showing.—*Breeding.*—The dates for live stock shows are generally announced so far ahead that no goat breeder need be caught with his stock unprepared. The first point, then, to bear in mind is that a doe which is to be exhibited ought not to be in kid, or at most not more than a month advanced in her pregnancy. The goat suffers more than most animals from the excitement of travel, confinement, crowds, and bad air, and the risk of abortion, if she is in kid, is serious. In the case of bucks it would seem advisable not to try to exhibit them during the breeding season. Even with the best of care their smell and their habits at this time are

likely to prejudice the public against the race of goats as a whole. Better to exhibit only the does, whose exquisite cleanliness quickly wins them friends even among the least friendly.

Feeding.—Of course, it is a temptation to feed generously an animal that is to be exhibited, but discretion as well as generosity should guide the rations. Remember that a true milk animal is not fat typically, but rather lean. The object of feeding should be to put the animal in good general condition, well fleshed and well muscled, with a loose, soft, mellow coat; but a fat animal, in dairy classes, will be discriminated against.

Care of the Coat.—The animal, of course, must be absolutely free from lice. Proper feeding, together with a vigorous brushing regularly twice a day for some time previous to the show will put the coat into attractive condition. A very good brush for goats, especially for the long haired does, is the Collie Dog Brush, sold by the Spratt Company. Washing may be necessary for white goats, and great care in regard to bedding must be used, to prevent stains. In the Swiss breeds no discrimination is made between the long or short coat of hair. In some recent shows in Los Angeles the ruling has been made that clipping a long haired doe is permissible. This improves her appearance of neatness as a milker and shows up to good advantage her points of conformation.

In other cases a long haired doe is merely trimmed across the shanks and around the udder. If either of these practices is to be followed, the clipping or trimming should be done some time before the show, so that the hair may have time to even up and to lie smoothly. The gloss of the coat is enhanced by close housing and the use of a blanket for some time before exhibiting. It is a question whether these artificial devices are desirable. They make the doe unnaturally susceptible to chill, so increasing the risks of exhibiting. Normal good care and good condition will usually produce an appearance so satisfactory that one should hesitate to subject an animal to this extra risk.

Hoofs.—What has been said elsewhere on the care of hoofs should be specially in mind for the animal that is to be exhibited. Not only must the feet be carefully trimmed at the last minute, but long before the show they must be watched to make sure the growth is quite true and even.

Milk Records.—Too much importance cannot be given to the need of definite records, especially in herds where pure bred bucks are offered for sale. By means of convenient equipment and regular system the labor of record keeping can be so reduced that no one will have an excuse for omitting this important detail of goat keeping.

Equipment and Methods.—Official records are kept in pounds and decimals of pounds. A variety of scales are in use for this purpose, of different sizes and prices, but all of about the same general arrangement. The empty milk pail is hung on a hook at the bottom of the scale. The pointer of the dial is controlled by a thumb-screw, and, with the empty pail on the hook, the pointer is adjusted to zero. After milking the pail is again hung on the hook, and the pointer on the dial records the exact weight of the milk. Milk record sheets of a wide variety are printed, and are for sale by any dairy supply house. A dairy scale, a record sheet with pencil attached, all convenient to the milking bench, make record keeping a very simple matter.

A daily record, for morning and evening, complete for the whole period of lactation, is, of course, the most satisfactory and reliable. If this is impossible, a weekly record, made regularly on the same day of the week, without varying the regular schedule of feeding and hours, does the next best to the full daily record, and will give a fair average of the doe's production. Even a single record for each month, if taken regularly, for the two daily milkings, and without varying the usual routine, is better than nothing at all. But a full weekly record would seem to be the least that a breeder should offer in making sales of stock.

Advanced Registry Associations.—All the great breeds of dairy cows owe in large measure their remarkable progress of recent years to the formation of Advanced Registry Associations. Under the rules of these associations the cows of members are regularly tested by association officials, and high records, thus officially obtained, entitle the cow to membership in the advanced registry of the breed. Bulls also become eligible to this honor through the official records of their daughters.

It can be readily seen what a powerful assistance this register of official records would be in the improvement of a breed of dairy animals. Goat breeders have not been slow to appreciate its importance, and the Toggenburg breed has taken the lead in establishing such an association. Full information concerning this Advanced Registry Association can be obtained by writing to the President of the National Toggenburg Breeders' Association, Professor E. C. Voorhies, University of California, Berkeley, California.

QUESTIONS

1. Why should a breeder exhibit his stock at a live stock show?
2. Give at least four helpful pointers in preparing animals for show.
3. Of what use are milk records?
4. What methods are employed in obtaining records?
5. What is meant by an Advanced Registry Association?

CHAPTER XVI

CARE OF THE HEALTH OF GOATS

General Rules.—Of all domestic animals goats are probably the hardiest and the most resistant to disease. If they are properly cared for and properly fed there will be little use for this chapter on sick animals. Warm, comfortable houses, open to the sun and kept scrupulously dry and clean, abundant and proper food, and plenty of exercise—these are the weapons with which to fight disease, not medicines. Nevertheless, ignorance or accidents or conditions beyond our control may sometimes lead to sickness, and for such emergencies a few suggestions may prove useful.

Equipment for the Care of Sick Animals.—In almost every kind of sickness it is better to isolate the animal as far as possible. Therefore, every herd should be provided with a "hospital," no different from the other goat houses except that it must be even more carefully planned to provide warmth, sun, a dry floor, and ventilation without draft. A goat's body temperature is rather high normally, but seems to be quickly affected by sickness, so that warmth and a quiet place are the first essentials to recovery. The goat keeper should be pro-

vided with several coats of different sizes, to assist in this effort to conserve the body warmth. These coats are an important part of his equipment. The pattern for making them is given in Fig. 52, and it can be adjusted to fit the size of a kid, a doe, or a buck.

The Coat.—The directions for making such a coat

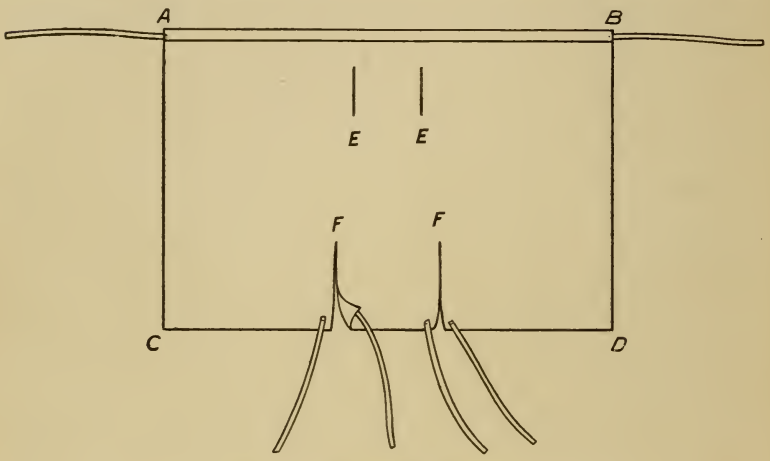


Fig. 52.—Pattern for making coats to conserve body heat.

are as follows: Cut a rectangular piece of canvas, the length to be equal to the girth of the goat at the largest point, the width to be equal to the length of the goat from half way up the neck to the base of the tail. In the illustration the piece would measure 30″ by 45″, the proper dimensions for a large mature doe of generous girth. Hem this piece from A to B, and run a stout cord through the hem. Cut two slits, E E, large enough for

the front legs to pass through. Cut two slits, F F, about 8″ from the edge of the piece, large enough for the hind legs. Sew on four pieces of tape, one at each of the corners where the slits F F are cut. Put the front legs of the goat through the slits E E, pull up the draw cord in

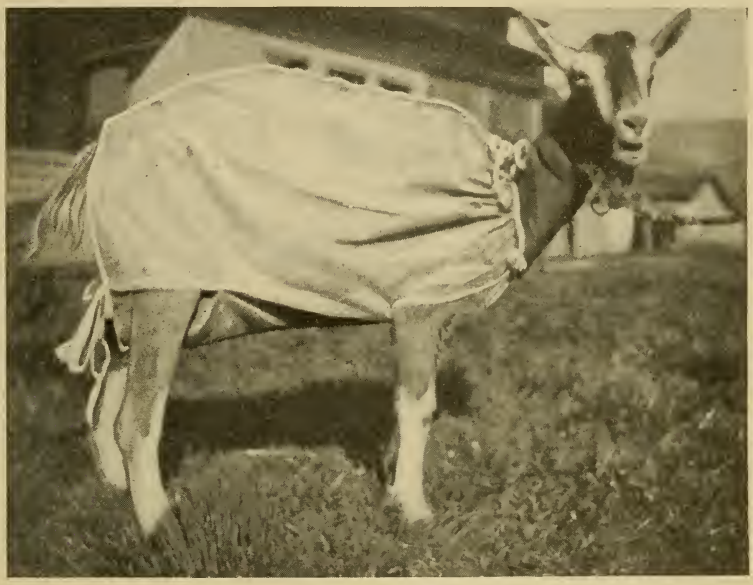


Fig. 53.—Doe wearing coat to cover udder.

the hem A B and tie it snugly around the throat, and put the hind legs in the slits F F, tying the tapes behind the legs. The edges A C and B D ought to lap snugly along the back of the animal, and can be sewed in place with a sail needle and string, or can be provided with buttons and buttonholes. To milk a doe wearing this

coat, untie the tapes and drop the flap, thus uncovering the udder. For a buck, cut a hole near the center of the coat to fit over the sheath.

Uses.—These coats are used in all cases of sickness to conserve the body warmth. They are used to cover and to hold in place a wool sweater over the chest in cases of pneumonia and other lung trouble (page 204), to hold in

FIG. 54.—Flap of coat untied and tucked forward, uncovering udder for milking.

place a covering for the udder in cases of mammitis or other trouble (page 215), to prevent self sucking (page 170), and to prevent kids from nursing (page 165).

Other useful equipment for a goat hospital would include a clinical thermometer, a fountain syringe with three tubes—a small and a large rectal tube and a vaginal tube—and a hand-bulb syringe with an aluminum tube, for the purpose of administering liquid medicines (Fig. 55).

General Treatment.—Thus prepared, if a goat shows signs of indisposition, put it in the hospital and, unless the weather is very warm, put on a coat. It often happens that a veterinarian can be consulted by telephone. His first question will be, "What is the animal's temperature?" Hence the need of the clinical thermometer, which is inserted in the rectum and held in place for three minutes; 102° is the normal temperature of a goat. If after two or three hours of isolation it is observed that the animal has passed no droppings, or if

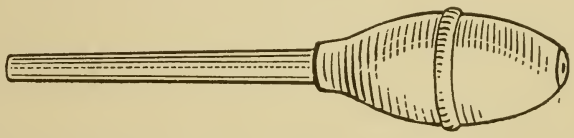


Fig. 55.—A hand bulb syringe, with aluminum tube, used to administer liquid medicines. May be obtained from veterinary supply houses.

those passed are hard and scanty, dry, and rather pointed, it is safe in almost all cases to give the patient an enema of warm water and soap or of warm water, two quarts, and Epsom salts, one tablespoon. This will often afford prompt relief. If medicines are to be given, the syringe described is the safest and most convenient instrument for administering liquid, such as salts or oil. Place the medicine in a cup conveniently at hand, stride the goat forward of the shoulders and hold it firmly, grasp the beard with the left hand and with the right hand draw the liquid into the bulb of the syringe, place

the aluminum tube between the back teeth and squeeze the bulb carefully. The flow of the liquid is thus under perfect control and danger of choking is avoided and none of the medicine is wasted. Some animals like the warm oil and will take it voluntarily, licking the cup clean. To others it must be administered forcibly.

Some Diseases to which Goats May be Subject:—

Pneumonia.—This disease more often than any other menaces the life of goats. Every effort should be made to prevent its appearance in the herd, and as it is the result of damp, cold, or drafty quarters, foul air, or exposure, there is usually no excuse for its occurrence. Journeys, however, are sometimes inevitable, and it is most often as a result of exposure en route that pneumonia makes its attack.

Symptoms.—Chill, followed by fever, temperature 104° to 106°. Loss of appetite, appearance of misery, faint, crackling sound in the lungs as the animal breathes, heard if the ear is pressed to the side of the goat. Sometimes a cough. Place the goat in the hospital. If the weather is cold, blanket it with a heavy wool sweater, putting the front legs of the goat through the sleeves of the sweater, and buttoning it over the back. Put the canvas coat on over this. Give the goat plenty of fresh air, and fresh water to drink, warm or cold, whichever it prefers. Rub the legs until well warmed, if necessary

using dry, ground mustard; bandage the legs in wool strips to maintain warmth. If relief does not follow, make a paste of ground mustard and spread it over the chest and sides back of the shoulder and underneath the body, pressing it through the hair to the skin. Cover the mustard with sheets of paper, draw on the sweater, and cover all with the canvas coat. To prevent blistering remove after one-half hour. Or antiphlogistine may be used instead of the mustard. To use the former, it is better to clip the hair close over the surface to be plastered. Apply the antiphlogistine as hot as bearable, cover with a layer of cotton, then the wool sweater, holding the last in place with stitches here and there so that it will lie close to the body. Over all put on the canvas coat.

This plaster will be removed next day, when it will probably be found dry and loose from the skin. When either plaster is removed, rub the surface briskly and at once return the other coverings. Give the animal an enema of warm water and soap or Epsom salts every other day if the bowels do not move naturally.

Avoid dry food, using warm bran mash or scalded rolled oats. If this food is refused, the fever will cause sufficient thirst to induce the animal to drink almost any liquid offered, so that nourishment can be maintained by giving the goat thin oat meal gruel, milk, or alfalfa tea.

For a stimulant, give spirits of nitrous ether, 2 ounces, aromatic spirits of ammonia, 1 ounce, mixed. Dose, 20 drops, two or three times a day. More than half the battle in pneumonia is won by careful nursing—providing for the animal sufficient warmth, fresh air, and nourishment.

Pox.—This disease, like cow pox, usually appears in fresh does, in the form of pustules on the udder, which later form scabs. It is communicated from one animal to another by the hands of the milker. If it appears in an individual, its spread can be checked by isolating the doe and disinfecting the hands after milking. It can be communicated to a nursing kid, appearing in the form of sores on the nose and mouth of the kid, sometimes spreading to other parts of the body. It is sometimes communicated to the milker, appearing in pustules on the fingers. It is not in itself a serious disease. Its chief danger lies in the fact that the udder sometimes becomes so sore that in a heavy milking doe it is difficult to extract all the milk, thus incurring the risk of caked udder.

The treatment is as follows: wash the affected parts with warm water containing a mild disinfectant (any standard sheep dip is good), dry carefully, and anoint well with vaseline or zinc ointment. If the udder is very sore, empty the bag several times a day, so that no great amount of milk collects at any one time. An epidemic

of pox in the herd may be followed by the appearance in some animals of small, hard lumps under the skin on various parts of the body. These persist for some time, but seem to do no harm. A vaccine for use in combating goat pox is prepared by the Cutter Laboratories, Berkeley, California.

Ophthalmia.—A form of contagious inflammation of the eyes occurs, though not frequently, in herds of goats in which the eyes become covered with a thick, white film, so that the animal is temporarily blinded. Treatment: use yellow mercuric oxide (Mulford), an ointment, applying a small amount to the surface of the eye night and morning.

Takosis.—This is a disease of goats that has appeared in Angora herds, but not to our knowledge among the milk goat herds of the United States. In the Bureau of Animal Industry Bulletin 920, page 35, the statement is made in regard to takosis, " The symptoms are somewhat similar to those accompanying the parasitic invasion of diarrhœa and pneumonia." A full discussion of this disease is given in the B. A. I. Bull. 45, " Takosis, a Contagious Disease of Goats."

Malta Fever.—This disease has appeared in the herds of " native " goats in Texas and New Mexico. It does not seem to have appeared further north than these states, nor in any herd of Swiss breeding. It is

discussed in the B. A. I. Circular 215, " Malta Fever."

Skin Troubles.—Mangy conditions, scab, itch, scurf, ringworm. Dip twice, at an interval of ten days, in a solution of nicotine, " Black Leaf 40," one-half ounce to eight gallons of water. If small areas only are affected, wash daily with disinfectant and apply sulphur ointment or iodine petrox in oil.

Foot Rot.—Symptoms: Lameness, feet swollen and hot. Caused by pasturing on low, wet ground. Treatment: Remove to high, dry pasture. Dissolve one pound copper sulphate in five quarts of water. Stand the goat in this solution, warm, daily, for a few moments until recovered.

Contagious Abortion.—While abortion somewhat infrequently occurs among milk goats, its cause can usually be traced to a blow, a fright, or an injury of some sort. No definite occurrence has been noted of a contagious organism causing abortion among goats similar to that so prevalent among cows. Nevertheless, every case of abortion should be eyed with suspicion, the animal should be isolated, the fœtus, afterbirth, and all bedding should be burned, discharges should be washed off the animal with disinfectant, and all quarters occupied by the doe should be scrupulously disinfected. The doe will be cared for as outlined in Chapter XIII.

Some Sicknesses to which Goats May Be Subject: *Indigestion or Colic.*—Symptoms: rolling on the ground, stretching the body; in kids: sharp cries of distress. Cause: eating too much green feed, or in kids, chill after the milk feed. Treatment: warmth, quiet, dose of warm, raw linseed oil or neutral petroleum oil; one-half cupful for a mature animal, down to two teaspoonfuls for a small kid. For a mature animal, add one teaspoonful of turpentine and one-half teaspoonful essence of peppermint. For a kid, a few drops (three or four) of essence of peppermint. Follow the oil in an hour with one 30-grain tablet of triple sulphocarbolate for a mature animal; one-half tablet for a kid. Dissolve in a little warm water. Most goats will drink the water containing this tablet readily. If they will not, use the hand syringe. Feed lightly until the animal appears normal again. Offer an occasional drink of warm water.

Bloat.—Symptoms: distention of the body, especially the left flank, arched back, labored breathing, general air of distress and misery. Cause: the eating of too much green feed, or wilted, soured, or moulded feed, sometimes caused by the eating of poisonous plants.

Treatment.—Place the forefeet of the animal on a box about eighteen inches high, knead the flanks, hold the mouth open at the same time by the insertion of a small round piece of stick across the mouth between the

teeth. Administer turpentine, one teaspoonful, and peppermint, one-half teaspoonful, in a cup of warm oil, raw linseed or petroleum. Repeat in half an hour if necessary. After the oil one-half teaspoonful of aromatic spirits of ammonia in a cupful of warm water.

If this treatment is not successful, one must have resort to the use of a trocar and cannula for puncturing the rumen to allow the escape of gas. This operation had better be left to a veterinarian or someone who has had experience with its use. After relief from the pressure of gas has been obtained, the animal should be kept warm and quiet and on a light diet of good, clean hay, dry bran, and rolled oats. No green food for a few days. Bloat caused by green feed can be prevented by turning the animals out only a short time at first, gradually increasing the time they are left in the pasture. A good feed of dry hay before turning them out also helps to prevent bloating from the green feed.

Constipation.—This is a rather frequent cause of indisposition in goats, and is remedied by the use of an enema, followed by a dose of oil.

A new born kid will sometimes show signs of distress, lying down and straining against the wall of its box with its hind legs and uttering cries of pain. This is caused by obstructed passage of the first fæces, a thick, black, sticky mass which usually comes away within a

few hours after birth, and is followed later by soft but firmer fæces of a bright yellow color. If it is plain that the first mass is not clearing out of the kid's intestines, use an enema of warm, soapy water, using the smallest tube, and working with the greatest gentleness. Normally a new born kid, properly dried, well bedded in a dry, warm box, and fed a proper allowance of its own mother's milk, will not make any sound at all, except a vigorous and imperative demand for more food at reasonable intervals. The wail of a suffering kid is of quite a different sort and cannot be mistaken.

Diarrhœa or Scours.—A new born kid will sometimes be afflicted with "white scours," caused by an infection from the mother. This disease is likely to be fatal, but prompt measures may save the little creature. It must be at once removed from the mother, and must be kept quite warm and clean and dry. Give one teaspoonful castor oil and three drops peppermint. Brown some white flour in a pan until quite brown without burning, mix to a thin paste with milk, and bring to the boiling point. Feed it to the kid quite warm with a spoon, one or two spoonfuls only at a time, every hour or so. Dissolve a tablet of the sulphocarbolate in half a cup of water, and administer a teaspoonful warm every two hours. If available, use Calf Scour Vaccine, according to directions. A kid afflicted with this disease either dies

or recovers within twenty-four hours. If it recovers, it will be more delicate than other kids for a time, and must be handled with especial care.

In all other cases of scours in kids the trouble is caused by lack of care in handling the little ones. Some of the mistakes that lead to this trouble are: chill caused by letting the kid outside in cold or damp weather, letting it sleep on damp or insufficient bedding, lack of drainage in its box or pen. Some mistakes in feeding that lead to the same result are: overfeeding, always the result of irregular feeding, or too long intervals between the feeds, so causing the kid to become so hungry that it overfeeds; drinking too rapidly, milk at too low a temperature, utensils not properly sterilized, milk not fresh, or a change made too suddenly from goat milk to cow milk or milk substitutes. Chill after milk or the feeding of green stuff directly after the milk leads to the same result.

If kids are kept always dry and warm, are fed clean, sweet goat milk at the intervals indicated in Chapter XII, in clean utensils, and suck the milk through a nipple, and are kept in their pens with dry hay only for an hour after the milk feed, so handled they can be given all the milk they want, and it is practically certain that no case of scours will result. Pan feeding and the feeding of cow milk and gruel are both sometimes necessary.

They can be used safely only if care and caution are exercised.

Treatment for Scours.—Remove the kid to a separated, dry, warm pen, and blanket if the weather is cold. Reduce the allowance of feed. Give boiled milk only. Assist it to rid itself of the irritating substance by a small dose of warm castor oil, one teaspoonful for a tiny kid up to two tablespoonfuls for a larger kid. Give a few drops, three to six, of essence of peppermint with the oil. Follow in an hour with one-half tablet of sulphocarbolate, dissolved in half a cup of warm water. If the scouring does not cease, make a thin gruel of boiled milk and brown flour, as described above, and feed it at rather frequent intervals in small quantities.

If the trouble does not yield to this treatment, other suggestions are offered, which may be tried in turn until good results follow. Give the kid an enema of one quart warm water and one tablet of sulphocarbolate dissolved in the water. Add to the boiled milk one tablespoonful of prepared chalk, twice a day. Or, use one tablespoonful of lime water in each feed of milk, and one hour after feeding give twenty drops of caripeptic liquid. Give a 20 grain dose of subnitrate of bismuth three times in one day.

In older goats also diarrhœa is usually caused by some disturbing element of the diet, or by too much wet

green feed. Remove the sick animal to quiet, warm quarters, restrict the feed to rather small quantities of good oat hay and *dry* bran, and administer a dose of warm, raw linseed oil, one-quarter cupful, and one teaspoonful of turpentine, together. Follow in an hour with one 30-grain sulphocarbolate tablet. This treatment will usually correct the trouble promptly. Give the animal only warm water to drink, in small quantities at a time, offered frequently.

Colds and Coughs.—These minor ailments, like pneumonia, are most often the result of an animal being shipped about. They usually yield readily to the treatment outlined above for other ailments—quiet, warmth, a dose of oil and a slightly laxative diet. To induce the animal to drink plenty of water, offer it frequently, fresh and quite warm. A sickness called "shipping fever" often manifests itself in a herd upon the arrival of a new member via the train. It runs through the herd as a cough of more or less persistence, and can be treated only as other coughs. It disappears in time.

Abscesses.—If abscesses appear, as they occasionally do around the jaws and throat of goats, watch them until a soft spot appears in the center of the lump. Then wash the place off with disinfectant; use a sterilized, sharp knife point, and lance, cutting a rather large slit. Press out the pus, wash with disinfectant, using a swab

to cleanse the interior of the abscess. Thus treated the abscess will heal more quickly than if left to break and drain of itself.

Accidents and Their Results.—*Mammitis.*—Under this head, in goats, would come first of all abortion and mammitis, or caked udder. The former has already been discussed on page 160. The latter is sometimes the result of a blow on the udder, but more often it is caused by a fresh doe lying on damp, cold ground. It may also be caused by the failure to extract all of the doe's milk from the udder at regular intervals, especially in the case of a heavy milking doe. This may occur from delay on a journey, from the carelessness of a milker, or when a doe is nursing kids, by the sudden death or sickness of the kids, who thus fail to relieve her full udder. If the trouble is noticed at an early stage, and prompt treatment is applied, the doe can usually be saved. Delay in obtaining relief may result in the death of the doe or in the permanent loss of one or both sides of her udder.

Symptoms.—A hardening of the udder first in a small spot or area, then in the whole of one or both sides. Fever, restlessness, and cries of pain. Take the doe quickly into the house or somewhere near a stove. Place a pan of water on the stove with a little turpentine or two tablespoonfuls Epsom salts in the water. Have an assistant to stand at the pan, wringing out flannel cloths

as hot as bearable as fast as they are needed. Envelop the udder in these hot cloths, wrapping a dry cloth outside, and changing as fast as the heat dissipates. Hold them in place with the hands. At intervals remove the hot cloths and massage the udder gently with hot oil, milking out whatever milk can be extracted as the udder gradually relaxes. It will probably come in the form of cheesy lumps and a watery fluid. This treatment may have to be continued for many hours, and is of course very wearisome and laborious. It is not too great a price to pay, however, if it will save a good doe from suffering, loss of the udder, or death.

After the udder shows some signs of softening up, anoint it thoroughly with Phytolacca Ointment (Abbott Laboratories), then draw over the udder a wool sweater, putting the hind legs through the sleeves, and buttoning it over the back. This may need to be further held in place by the canvas coat described before. At frequent intervals afterwards, say every three hours, uncover the udder, massage it, and rub on the ointment, milking out each time whatever liquid can be extracted. As the udder gradually returns to its normal condition the intervals can be lengthened, but the use of the ointment and the sweater should be continued as long as there is any appreciable area remaining hard. If this treatment is not started too late, the udder will entirely recover

and the future yield will not be affected, although the yield for that season must be expected to be seriously decreased.

Wounds on the Udder.—Small cuts or scratches should be washed with disinfectant and should be well greased with vaseline. A deep cut on a heavy milking doe gives much care and trouble. There are few cases where it is possible or advisable to stitch up a cut on the udder, as the constant distention and relaxation caused by the flow of the milk and its extraction pulls the stitches out of place and delays healing. Wash the wound with a mild disinfectant and cover liberally with Unguentine. Draw over the bag a clean cotton shirt, putting the hind legs through the sleeves and buttoning the shirt over the back. Hold it in place with the canvas coat. This keeps the wound clean. It will heal more rapidly if the doe is milked out every two or three hours, thus preventing the distention of the udder. It should be regularly cleansed and anointed twice a day.

Prolapse of the Vagina.—This occasionally occurs when a doe is carrying two or three very large kids, and their weight near the end of the pregnancy thrusts out the vagina when the doe lies down. This can be prevented by tying the doe in a stall so narrow that she cannot turn around, and by putting a couple of boards in the floor of the stall, the ends resting on a support

about eight inches high. This raises the hindquarters of the doe and relieves the pressure. After such a prolapse, syringe the parts with normal salt solution, warm, to cleanse and to relieve congestion.

Teeth.—Sometimes a tooth will be broken accidentally, or will be lost otherwise. If this occurs to one of the back teeth the corresponding tooth above or below will tend to grow too long, cutting into the cheek of the doe and causing sores. Any trouble in the mouth as soon as noticed should be reported to the veterinarian, who can usually adjust matters to give relief and comfort.

Foxtail in the hay is a baneful source of mouth trouble. If a herd is afflicted with hay foul from foxtail, first get rid of the hay, then carefully examine the mouth and extract the malignant tails from their lodging places.

Foreign Bodies Ingested.—Goats sometimes die from the effects of swallowing foreign bodies. Little can be done to help such cases, therefore the more reason for vigilant precaution. Be careful that no bits of wire or glass get into the feed, especially that of the kids. For some unexplainable reason, a kid will occasionally eat considerable quantities of mud, with resultant serious indisposition. Indications that this is going on are the drooping of the kid, its loss of appetite, and a perceptible heavy and solid feeling to its body when the

stomach is pressed from below. Prompt use of enemas, two or three a day, and repeated small doses of oil will finally eliminate this foreign matter from the system, the character of the droppings and the return of appetite indicating the return to normal conditions.

Plant Poisoning.—No general discussion of this subject is possible, because the poisonous plants of one district differ from those of another. There are several B. A. I. bulletins on the subject and the different state universities publish similar bulletins for their respective localities. If a herd of goats is on range or pasture it would be well to obtain all the information possible as to the local poisonous plants and their antidotes. In general, however, it may be repeated here that a herd reasonably well provided with other food has a dependable instinct to avoid poisonous plants.

Parasites.—Lice are a baneful curse to goats, and there is small excuse for their persistence in a herd. They most often make their appearance when goats are kept with or near chickens, or in houses formerly occupied by chickens. They sap the vitality of goats, especially kids, and keep them looking thin and rough. If a lousy condition is discovered there are several remedies. For a few goats the most prompt and efficient treatment consists in sponging the body thoroughly with a mixture of one part kerosene and two parts melted lard or other

soft grease. This kills lice and nits both at one application, and although it leaves the animal looking rather messy for a few days, the appearance of the coat is later greatly improved. Spray the quarters with a strong insecticide. Undiluted sheep dip and kerosene is a good spray for this purpose. Do not use the lard and kerosene on pregnant does. Whenever used, these two ingredients should be in perfect emulsion.

For a pregnant doe or for kids use one of the standard lice powders repeatedly, brush often and thoroughly, and spray quarters. This will bring about the desired result, but more slowly than the lard and kerosene. For a large herd build a dipping tank and dip all individuals twice, according to the instructions offered with the usual standard sheep dips. This treatment would not be safe for fresh does except in warm, dry weather.

Worms.—Symptoms: loss of flesh, weakness, diarrhœa, paleness of the membranes of the eyes and mouth. Caused by pasturing too long and too intensively on a given space of ground. Treatment: frequent change of pasture. Dissolve one ounce copper sulphate in three quarts of water. Keep the animals off feed and water the night before they are to be treated. Next morning dose as follows: Kid three months old, ¾ ounce; kid six months old, 1½ ounces; goat twelve months old, 2½ ounces; goat eighteen months old, 3 ounces; goat twenty-four months old, 3½ ounces.

QUESTIONS

1. Name at least three preventives of disease in goats.
2. What equipment is needed on the average goat farm for the treatment of disease?
3. Give the symptoms and treatment of pneumonia.
4. How is pox spread? What is the treatment recommended for pox?
5. Give the symptoms and treatment of colic in goats.
6. What is the cause of bloat? What would you do for a severe case of it?
7. What precautions must be taken with "white scours"?
8. What remedy would you recommend for constipation?
9. What treatment should be given a caked udder?
10. How can goats get rid of lice?
11. What are the symptoms of worms in goats? Remedy?

CHAPTER XVII

HOUSING AND EQUIPMENT FOR GOATS

Fences.—The most important thing to be said on the subject of fencing is, never under any circumstances use barbed wire, anywhere, for any purpose, where goats are to be kept. Unlike other animals, the dread of cuts and scratches is no deterrent to the adventuresome spirit of the goat, and the only effect of the pernicious barbs is—ruined udders, mutilated bucks, and all sorts of cuts of varying degrees of seriousness.

For Bucks.—The most successful fence for a buck when he is confined to a corral is one made of stout pickets, upright, about seven feet high. Stock wire does not long survive the constant friction of the buck's hoofs climbing upon it, wearing the strands and pushing down the stoutest fence with his weight. A well braced paling fence is the most permanent and sightly equipment for this purpose, and seven feet is none too high if the buck is young and no accidents are to occur during the breeding season. If a buck is in the freedom of a spacious pasture, removed from the does, an ordinary stock-wire fence about five feet high does very well, as he makes no special effort to escape.

For Does.—For does a light, four foot, stock wire fence will be sufficient, if they have some exercise each day on range or pasture. If confined constantly in the corral, a heavier wire must be used, as they will spend considerable time trying to climb the fence, and will soon

FIG. 56.—Buck houses and fence. The houses are built on sloping ground, affording drainage for the yards, they open to the south, and the fence on the west is of solid boards, thus protecting the yard from north and west winds. The fence is seven feet high.

break through the strands and push down the fence unless it is quite strong and well braced. All sloping braces must be carefully covered, otherwise the goats will promptly walk up the brace and leap the fence. Chicken wire is useless for goats, even for kids. Their

sharp hoofs so soon cut through this light material that it is a waste of time to erect it.

Corrals.—Goat corrals should always be well drained, and should be fully exposed to the sun in every portion. The fence on the "weather" side should be of solid board, to shelter the goats from strong, cold winds. The surface should be sufficiently hard so that the droppings can be swept up without too much mixture of dust. If kept clear, these droppings command an extraordinary price from intensive horticulturists, as their value for fertilizer is in excess of any other manure known.

Play Apparatus.—The corrals for young stock must be provided with apparatus for exercise. A "slide" is an important item. Place a large packing box in the center of the corral, bottom side up, about 3½ feet high, and behind it place another box about half as high. Slope a stout, smooth plank, 2″ by 12″ by 15′, from the front edge of the large box to the ground, and fasten both ends securely. This simple arrangement provides endless combinations for rough and tumble games. Another useful device is a "horizontal bar," adapted for kid use as follows: place two pieces of 2″ by 4″ upright in the ground, four feet apart and three feet above the ground. Join at the top with another piece of 2″ by 4″, wide side up, and from each end of this bar slope to the ground a piece of 2″ by 4″ about five feet long, extending into the

ground at the end. This, too, will prove a popular source of amusement.

Each corral must be further fitted in warm climates with a shelter for shade. There must be proper facilities for a constant supply of fresh, clean water. There

FIG. 57.—A simple arrangement for exercise.

must be a salt rack, off the ground and high enough to be reached only by some stretching, protected from rain. Salt placed in a box on the ground is wasted. It is soon filled with dirt and the goats will not touch it. Large lumps or cakes of stock salt, hung in a piece of folded chicken wire netting makes a satisfactory rack.

Staking Apparatus and Collars.—For the doe that is to be staked out for feed or for exercise the following apparatus will be found useful. A staking pin should be about two feet in length, with a large head fitted with an eyelet that turns freely on the stake. When in use the stake should be driven into the ground close to the head, and the stake rope should be attached to the revolving eyelet by a swivel snap. The other end of the rope is attached to the goat's halter by another swivel snap, and if the rope is fitted in the center with a third swivel the inconvenience of snarled and knotted ropes will be avoided. A stout rope is better than a chain. A goat if frightened is likely to hurl herself the length of her tether, and if it is a chain the danger of cutting her legs or her udder is considerable. A strong halter carefully fitted to the head is better for staking purposes than a collar. It is the practice in most herds to use for collars wide, heavy strips of leather, overlapping and laced securely in place with raw hide thongs or belt lacings. This is better than buckles, as the collar cannot come unfastened. Moreover, goats love to rub themselves against the wire of their yard fences, and a buckle is likely to catch in the wire with inconvenient results both to the doe and the fence.

It is the usual practice to clamp into this heavy laced collar the goat's registration tag, and this is an additional

reason for desiring security for the collar. These metal number tags, furnished by the Record Associations, are called " ear tags." But the beauty of our milk goats is so highly prized that few owners desire to mutilate them by actually inserting the tags in the ear, or by using any of the systems of notching the ears sometimes practiced for other live stock for identification. The registration tag, securely clamped into a strong, closely fitted, well laced collar, serves all practical purposes, and adds to the good appearance of the goat. The collar should be provided with a harness ring before it is laced on, to facilitate fastening in the stall, but for staking a strong halter is necessary in addition to the collar, to prevent the possibility of injury to the throat of the animal.

Goat Houses.—*Range Sheds.*—The plans for goat houses will vary considerably according to climatic conditions and the type of herd that is to be sheltered. For such a herd as was described in Chapter VI, consisting of a large number of goats of relatively little individual value, expensive or elaborate quarters would not be suitable. Long sheds, open on the side least exposed to bad weather, built on sloping, well drained ground, make an inexpensive shelter that in such conditions would serve very well. These sheds would be provided with feed boxes for hay, such as are described below. The manure would be allowed to accumulate in winter, providing a

warmer surface to sleep on. If perfectly protected from rain and well drained below the manure makes a warm, dry bed for the goats. Does that are near kidding time should be removed from these sheds and be placed in separate kidding pens.

Houses for the Valuable Herd.—When substantial buildings are to be erected for goats, there are some general points that must be borne in mind for all houses, however much they vary in purpose. Build so as to admit the largest possible amount of light and direct sunshine into the houses. Provide abundant ventilation, obtained without creating drafts. Construct all floors with some system of drainage that will ensure the prompt removal of urine, so as to keep the floors dry and warm without the use of an excessive amount of bedding.

To construct a floor that is easily drained and easily cleaned, concrete is doubtless the best material to employ. But the experience of goat keepers is against its use, as it seems to involve a constant risk of chill to the animals and many attendant ailments. Cork brick, sold by dairy supply houses, makes an ideal floor for warmth and sanitation, but is rather expensive. A well built floor of good heavy lumber, properly sloped and drained, and treated liberally with one of the standard wood preservatives, makes a satisfactory substitute for concrete in goat barns and is cheaper than the cork brick.

Feed Boxes.—Where groups of animals are kept together loose in one compartment, as is usually the case with kids and goatlings and often with mature animals as well, the following type of feed box is recommended. Fig. 58 shows a pen for twenty-four kids or goat-

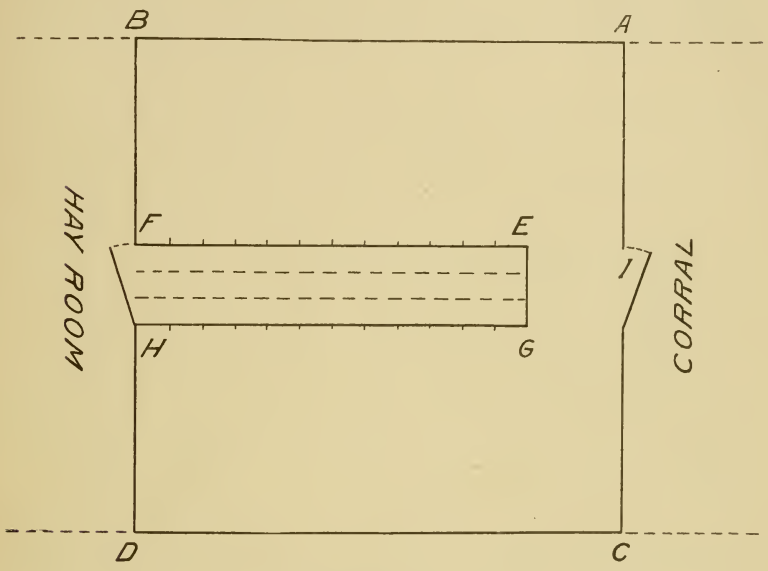


Fig. 58.—Model feed box.

lings. This pen, A B C D, is 15 feet square. Down the center, extending from the partition B D is built the two sides of the feed box, E F and G H, joined at the end E G by a partition of heavy, close wire or boards.

The construction of the sides of the feed box is shown in Fig. 59, and a detail of the stanchions is

given in Fig. 60. This form of feed box is very successful in preventing the waste of hay. The goat must lift its head rather high to reach the head opening, and then must drop it down the neck slot to reach the feed in the box. This prevents, to a great extent, the loss of hay, which the goat is inclined to pull out of a feed box and scatter on the floor. The box is

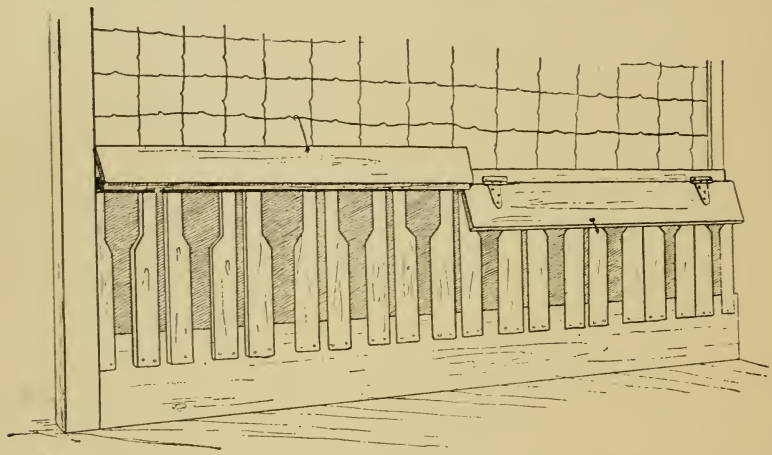


Fig. 59.—Side of feed box, showing the pairs of stanchions as arranged for mature does, with drop boards hinged on the outside of the stanchions. When the does have taken their places with their heads in the feed box, these boards are dropped and hooked down. The doe has comfortable space to stand erect but cannot withdraw her head until the boards are lifted. Above the side of the feed box stock wire is extended to prevent the goats from jumping into the feed boxes.

filled from a hay loft above or from a hay room adjoining the box by the door F H. The other door, I, is the entrance for the goats from their corral. This feed box is rendered more efficient if it is fitted with hinged drop boards as shown in Fig. 59. This is a quick and simple way of locking the does in place while they are

eating, so preventing "scrapping" among the goats, and insuring an equal portion to each animal. It still further prevents the waste of hay, since it is impossible for the doe to extract her head while she is feeding. Kids

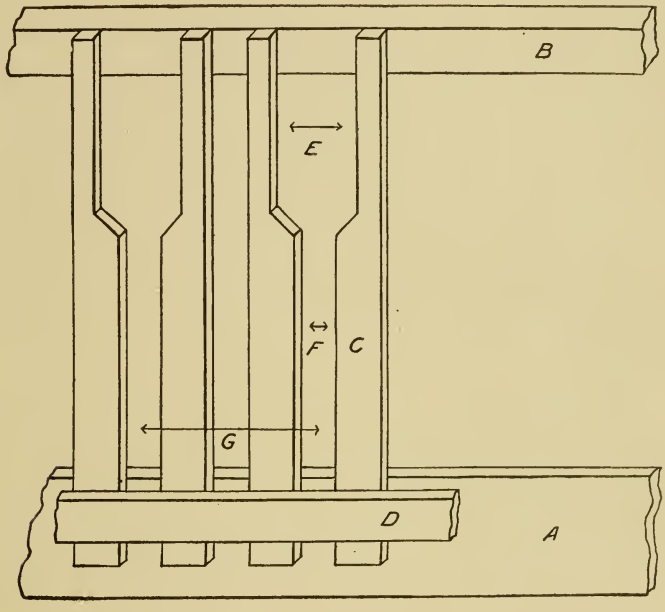


FIG. 60.—Detail of feed box—two pairs of stanchions shown without the locking boards. Spaced suitably for kids: (*A*) base board of the side of the feed box, 1″x8″; (*B*) top piece of feed box, 2″x4″; (*C*) one stanchion, 1″x3″, piece cut out for head opening 1½″x12″; (*D*) extra piece nailed on outside of the stanchions, for the kids to put their fore feet on, in order to reach up to the head opening; (*E*)head opening, 6″ wide; (*F*) neck slot, 3″ wide; (*G*) distance from center of one pair to center of next pair,—12″. For a mature doe, *E*-7″, *F*-4″ and *G*-18″. The space thus left between each pair of stanchions is filled in with lathes. For bucks, *E*-9″, *F*-6″, *G*-24″.

ought not to be locked in, but older animals do better if they are thus fastened for an hour or two for each feed of hay.

The stanchions in the illustration are spaced 12 inches apart for kids or goatlings. For mature does they should be spaced 18 inches apart. The box is 2½ feet wide. If it is to be used to feed the grain ration as well as the hay, lay a plank 2″ by 12″ down the middle of the box, making a raised walk, and line the corresponding troughs thus formed on either side with galvanized tin. When the hay is eaten, and the dust and refuse swept out, these two shallow troughs will serve admirably for the mash or grain. For mature does the neck slot should be spaced about four inches, for kids three inches. On a feed box intended for small kids a foot board should be added (Fig. 60) to enable the little ones to reach up to the head hole.

For bucks another modification of this box should be made. The stanchions, instead of being nailed permanently in place, must be attached to the cross pieces above and below by bolts. The cross supports will have several holes bored in a line to hold the bolts, so that the stanchions can be moved and bolted in place now at one point and now at another, thus changing the width of the neck slot. Three inches is the right width for the neck slot for buck kids—if wider they will push through and get into the box. But as a buck approaches the age of eight months his neck rather suddenly begins to enlarge and to assume the more massive proportions of

the mature buck. As this change begins, his neck slot must be at once widened, or serious injury to the throat will result. For the mature buck a slot six inches wide is necessary. Bucks cannot be locked in their stanchions very successfully. They are so powerful that it would be hard to build a box substantial enough to hold them

FIG. 61.—Feed box in use.

if they tried to free themselves. For this reason they are usually left free, and if there is more than one buck, and they do not eat peaceably together, stout box stalls are the most convenient way of feeding them.

Sleeping Arrangements.—Almost all goats prefer to sleep out of doors if permitted to do so. In dry weather,

not too cold, in a dry, well drained corral sheltered from the wind, it is advisable if possible to arrange their quarters so that they can sleep in or out at will. When it is necessary for them to sleep in, the kind of floor described above makes good sleeping quarters, especially if covered lightly with sawdust or shavings to absorb whatever wet is not drained off. For kids, in addition to the sawdust, plenty of dry, clean straw should be provided to insure warmth. All goats except tiny kids and very heavy pregnant does prefer to sleep on a bare shelf, which they keep quite dry and clean. If space and other considerations permit, it is very desirable to provide them with shelves, about two feet wide, two feet high for kids and does, and three feet for bucks.

Stalls.—For valuable, mature does it is often desirable to provide some other sort of quarters than an open pen. For this purpose the goat owner has the choice of a series of tie stalls or of box stalls. For the former, a row of partitions, two feet apart, two and a half feet high, and three feet long, placed along the side of the feed box, make a convenient arrangement. These stalls are even more comfortable and convenient if they are built on a raised platform, about 18 inches above the floor, made of 1″ by 3″ slats spaced one inch apart. This spaced floor insures the doe lying on a clean, dry surface. The feed box would have to be correspondingly raised above the

actual floor level. Such tie stalls are especially to be desired for the pregnant does, for they protect them against the dangers of fighting and jamming that are so dangerous to her condition. For the last few days of her pregnancy a box stall is necessary, where she will kid in peace and comfort. A good size is 4′ by 5′ for

Fig. 62.—Tie stalls, on a raised platform. (Courtesy of the Goat World.)

for this stall or pen, which will be fitted with a feed box of its own. Whatever other arrangements may be adopted, several of these individual pens must be provided for the use of the kidding does.

Milking Room.—Cleanliness, as well as the various state and city health ordinances, demands that the milking be done in a room separated from the sleeping and

living quarters of the animals. Such a room can be very tiny, if only one or two goats are milked at a time, or it may assume the proportions of the milk barn used for the goats of the Widemann Condensary herd, a room measuring 40′ by 80′ and accommodating 300 does at a time. In any case, small or large, the chief thing to bear in mind for the milking room are facilities for cleanli-

Fig. 63.—Home made Milk Bench. (Missa D., 301.) (Courtesy L. C. Buhl, Pomona, Calif.)

ness and for ease and speed in milking. The floors should be of concrete, the walls smooth and painted. A sink and a hose are part of the necessary equipment. The floor must slope to a drain connected with the sewer. As the goat is such a small animal it is more comfortable to milk her if she is on a raised bench or platform.

Fig. 64 shows a convenient type of bench, 15 inches high, provided with a locking stanchion and a hoop to hold the grain pan, as it is the usual custom to feed the milking does their allowance of grain while they are being milked. For a few goats this is the nicest

Fig. 64.—Milking bench, showing locking stanchion and a hoop to hold grain pan.

possible arrangement. It is even more convenient to have two such benches, admitting two does at once, so that each has ample time to finish the allowance of concentrate before the milker is ready for the next pair.

If the milk band numbers scores of does, these individual benches, and the frequent changing of the animals that they necessitate, are too time consuming. Milking arrangements for long strings of animals are shown in

Fig. 65.—A neat style of milking bench. (Courtesy Dr. Carl Wilson, Palo Alto, Calif.)

Figs. 66 and 67, being photographs of the Widemann milk barn, before the does are admitted, and during the milking. In this arrangement the grain is

put out in a long feed box from a feed alley, the does are admitted, take their places on the raised platform, and are locked in stanchions 18 inches apart. The milkers then pass rapidly from one goat to the next, milking from behind. If it is especially desired to milk from the side, and most Americans do not take kindly to the

Fig. 66.—Milking arrangements. (Widemann Goat Milk Co.)

European habit of milking from the rear, this same arrangement of platform and stanchions can be adapted to that end. Space the stanchions 24 inches apart instead of 18 inches, and make the platform of 1″ by 12″ boards, alternately 3′ and 4′ long. The stanchion will be at the end of the longer board. The doe will stand on

this board, and the milker, sitting back on the end of the shorter board, will be in a convenient position to reach the udder from the side.

A good many goat owners, however, find it perfectly convenient to milk their goats standing on the floor, the

Fig. 67.—Milk does in place. (Widemann Milk Goat Co.)

milker sitting on a low stool. This is, of course, the simplest arrangement to adopt, but would prove tiresome to a tall person.

Milk House and Sterilizing Room.—*Care of Milk.*—The separate milk house and its somewhat elaborate equipment for cooling, bottling, and storing milk, and for

cleaning and sterilizing utensils, is an essential part of a goat dairy. Plans for this equipment are issued by dairy supply houses and by agricultural schools and stations, for cow dairies, and these plans should be studied and adapted in miniature to the needs of the commercial goat dairy.

For the family goat a few suggestions may be useful

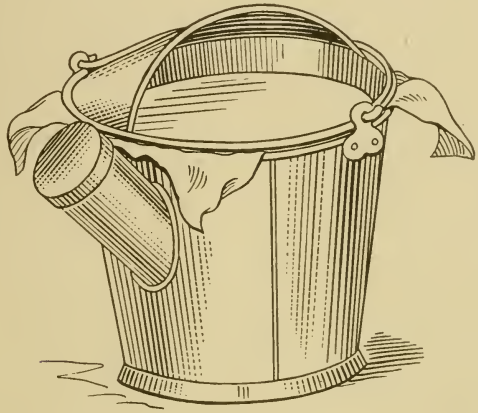


FIG. 68.—Proper milking bucket with covered spout, half hood and a strainer cloth.

in maintaining the high quality of the goat milk. The milk room and the milk bench should be kept scrupulously clean. The doe, if not naturally short haired, should be kept smoothly clipped on the flanks and stomach and around the udder (Figs. 74 and 75). She should be brushed before milking, and her udder should be wiped with a damp cloth. All buckets and other uten-

sils should be thoroughly sterilized each time they are used. A milk bucket with a covered spout, a half hood, and a strainer cloth should be used for milking (see Fig. 68). As soon as obtained the milk should be poured into a receptacle set in cold water, if possible in cold running

FIG. 69.—Milk house. The milk is cooled by running in a thin sheet over a tubular surface, chilled by the passing of cold water inside the tube. (Widemann Goat Milk Co.)

water, to extract at once the body heat from the milk. It should then be stored in a clean, cool place where it cannot be contaminated by the smell or flavor of other objects. So handled, the milk will keep a long time, maintaining its delicious flavor unimpaired.

A Model Home Dairy.—Fig. 70 will serve as

an example of a complete and convenient miniature home dairy, fitted up for two family does. The kidding pen, after a doe is fresh and is returned to her tie stall, may be used for the little ones if they are to be raised. The partitions of the milk room should be of

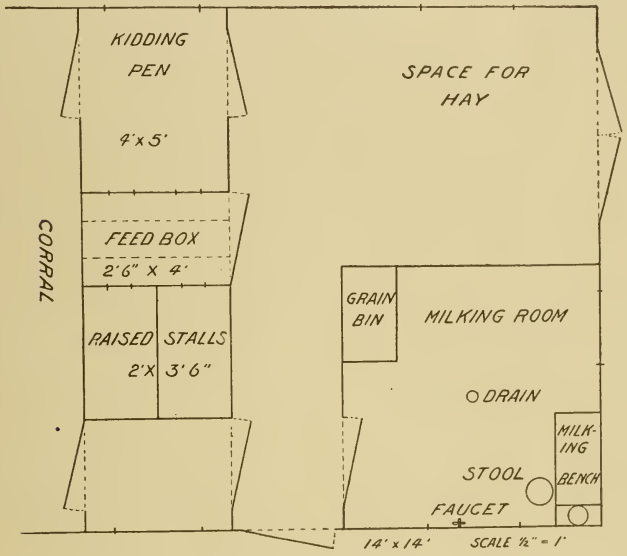


FIG. 70.—A model home dairy for two does. 14'x14'. The kidding pen is used for the does at the time of kidding only. After the doe is fresh, if there are kids to be raised, they can be kept in the kidding pen, which can be fitted with two or more pairs of stanchions opening into the feed box.

tongue and groove. All other partitions may be of heavy wire.

A Model Commercial Dairy.—Fig. 71 shows a barn arranged for a small dairy herd, consisting of 17 mature does, 14 goatlings, and 15 doe kids, with tie

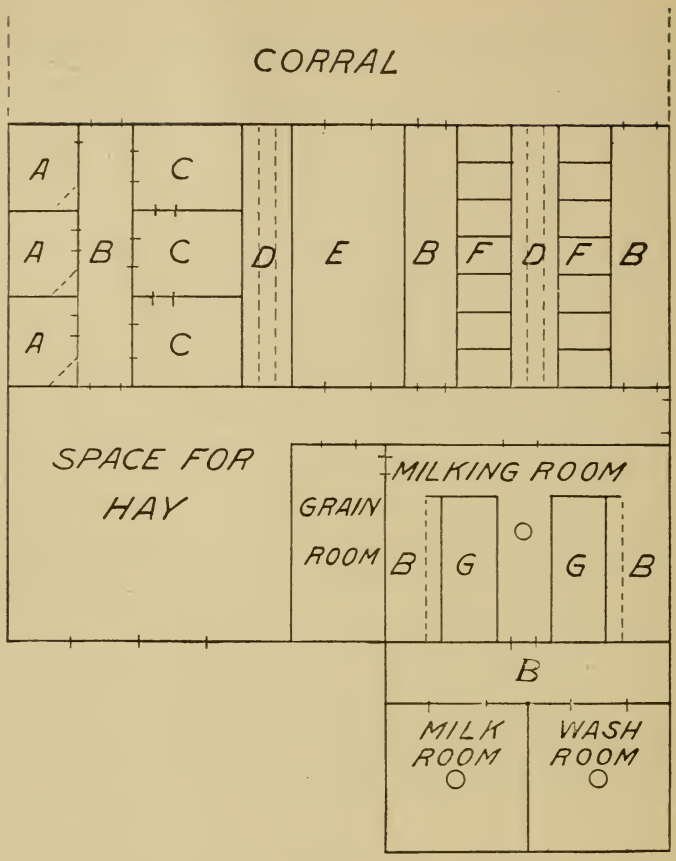


FIG. 71.—Plan for a model commercial dairy, to house 17 mature does, 14 goatlings, 15 doe kids. By adding 14 feet to the barn, the capacity will be doubled each set of pens being duplicated. 28′x36′. (*AAA*) kidding pens, each with a feed box in the corner. 4′x4′8″. (*BB*) passages; (*CCC*) kid pens, each opening into the passage and thence into the corral, and opening into each other by connecting gates. 4′ 8″x6′. (*DD*) feed boxes, each with raised center board. 2′6″x14′. (*E*) pen for goatlings. 6′x14′; (*FF*) raised stalls for mature does. 2′x3′; (*GG*) raised platforms on which the does stand while being milked, their heads through stanchions opening into a grain trough. The pens *CCC*, *E*, and the stalls *FF*, all open into the feed boxes *DD* by means of stanchions. The milking room, milk room, and wash room have cement floors, each with a drain in the center connected with a sewer. The milking room is 11′x15′, the milk room and wash room 7½′x8′ each. No windows are indicated, they should be numerous, and open to the sunny exposure.

stalls for 14 does and box stalls for three, and a milking room for eight does at a time. A milk house and wash room is connected with the milking room by an enclosed passage. For a larger herd this plan could be easily doubled, or adapted to any required number of animals. With the help of its accompanying key the plan will probably explain itself in all details except for the arrangements of the three kid pens C C C.

Pens for Feeding Kids.—If a group of kids are given their milk by hand, either through nipples on a " gang feeder " or in pans, they must be handled in three compartments if one is to avoid a riot at each meal hour. The plan illustrated would be used as follows: the three pens C C C would ordinarily stand open into one pen by the connecting doors. At meal times first drive all the kids into the further pen and close the door. Bring the milk and the feeding equipment into the middle pen and get everything ready. Then let the kids into that pen four or five at a time, and when they are fed, put them out into the third pen and close its door.

If the kids are normally strong, lusty, and hungry, it is hard to get them through an ordinary door, they crowd so eagerly. To prevent this difficulty, make this door in two halves, hinged separately. Open only the upper part of the door and the kids will leap over. It is easier to control their onrush in midair than when they are all crowding and shoving on the floor.

In the model barn illustrated, no space is provided for bucks, young or old. Their quarters must be at a distance from the doe barn, and can easily be constructed to fit given circumstances from the various suggestions given elsewhere for housing bucks.

Feeder Box for Kids.—Fig. 72 shows a con-

Fig. 72.—Feeder box for nursing kids.

venient " gang feeder " for kids who suck their milk. It is made of galvanized tin, 26″ long, 6″ wide, 5″ deep. The ends are not square, but at an angle, so that when the box is hung on the wall the front edge is lower than the back, thus draining out the milk. Five ½″ nickel pipes, 1½″ long, are soldered into the lower edge of the

box, and the ends are wiped with solder to duplicate the lip of a nursing bottle. The nipples fit tightly and firmly over this lip. Ordinary nipples have holes that are too small for a nursing kid. Cut a slit 3/16 inch in the end of the nipple, so that the kid, in nursing, will press it open. When not pressed, it will close and hold the milk from dripping.

FIG. 73.—Outside view of easily constructed goat barn.

Boxes for New Born Kids.—The kid boxes referred to in Chapter XII as necessary in the care of the new born kids are constructed as follows: the box itself is 2 feet deep and 3 feet square. This size will comfortably hold about six tiny kids. The sides are made of smooth pine, easily washed, and the bottom is made of heavy, galvanized wire netting, with a half-inch mesh.

This box is set on a tray, about 5 inches deep and the same size as the box. The tray is made of tongue and groove, carefully joined, and painted with several coats to make it quite water tight. This tray is filled partly full of sawdust. The bottom of the box, resting on the edges of the tray, is an inch or so above the level of the

FIG. 74.—Long haired goat before being clipped for sanitary milking.

sawdust. All moisture from the box drains out at once, leaving the bedding for the kids dry and warm. The water tight tray protects the floor so that the new born kids can be kept in the house.

Shipping Crate.—The dimensions for a mature doe are 2′ wide, 4′ long, 3′ high. The frame is of

good, clear 1″ by 3″ lumber, filled in with lathe, closely spaced. The floor is of 1″ by 12″ boards, slightly spaced for drainage. There is a sliding gate, a feed rack made of chicken wire in one corner, and a hinged board in the top of the crate above the hay rack for filling the rack and for watering the animal en route. Buck crates are

FIG. 75.—After being clipped.

of similar construction, dimensions 2½′ by 5′ by 4′.

This completes the list of essential equipment for the goat keeper. If it seems at first somewhat elaborate and costly, let no one be deterred on that score from the contemplated purchase of a goat, or a herd of goats! Remember that these instructions are an effort to place at the service of the beginner the best fruits of the experi-

ence of many breeders over many years. Good results are often obtained from the roughest sort of makeshift contrivances. But the underlying principles for the care of milk goats here presented will serve as a basis for all forms of construction. The varieties of these forms will be limited only by the ingenuity of the American Goat Breeder.

QUESTIONS

1. Enumerate the essential features of a good fence for goats.
2. What characteristics should a good corral possess?
3. What are the essential features of a good goat house?
4. What details would you look for in a good milking room?
5. What precautions should be used in milking the doe?
6. What should be done with the milk as quickly as it is drawn?

APPENDIX A.

Composition of Goat Milk

The following statements and analyses are taken from the University of California Bulletin 285, pages 93 and 94.

Composition of Goats' Milk.—The composition of goats' milk varies as that of cows' milk, with the breed, period of lactation, and the individuality of the animal. But little information is at hand concerning the composition of the milk of goats of different breeds. So far as known, the milk of the breeds of Swiss origin does not contain as high a percentage of butter fat as that from the Anglo-Nubian, or even from some of the common goats. As the doe advances in her period of lactation the fat content of the milk increases. This also varies with other conditions, like intervals between milking, completeness of milking, etc., so that the test of a single sample of milk will not give a reliable index to the average quality of the milk. This can only be obtained by regular testing of the milk for one or more full days at intervals during the lactation period, in the same way as for dairy cows. A few analyses of goats' milk taken from different sources are given below.

Composition of Goats' Milk (Geneva, N. Y., Agricultural Experiment Station)

Analyses were made of twenty-three samples of milk from eleven animals:

	Average per cent.	Variations per cent.
Fat	3.82	1.80– 8.40
Total solids	12.12	9.22–17.63
Total proteins	3.21	2.24– 5.21
Casein	2.40	1.56– 4.06
Ash	.55	.40– .80

Specific gravity, 1.0294.

Composition of Goats' Milk (California Agricultural Experiment Station)

Analyses of the milk from the does in the University herd are made weekly. The averages given below are the result of the analyses made weekly during the entire lactation periods. With one exception these does were Toggenburgs.

	Average per cent.	Variations per cent.
Water	88.05	91.5–85.2
Total solids	11.95	9.5–14.8
Fat	3.40	1.7– 5.6
Solids, not fat	8.55	7.8– 9.2

Other sources give the composition of goats' milk as follows:

Authority	Water per cent.	Fat per cent.	Casein and albumen per cent.	Sugar per cent.	Ash per cent.
Renesse	85.50	4.80	5.00	4.00	.70
Landweinth	85.60	4.60	4.80	4.30	..
Hoffman	86.19	4.73	3.68	4.50	.90
Koenig	86.88	4.07*	3.76	4.64	.85

* Variations, 2.29–7.55 per cent. (compiled from about 100 analyses).

In the Bureau of Animal Industry Farmer's Bulletin No. 920, on Milk Goats, the following analyses of goat and cow milk are given.

	Goat milk	Cow milk
Specific gravity	1.0338	
Fat	5.99 per cent.	3.9 per cent.
Solids not fats	10.97	9.0
Total solids	16.96	12.9
Sugar	4.93	5.1
Protein	4.63	...
Water	83.04	87.1

It may be remarked that the analyses given by the Geneva station and the California station are based for the most part on the milk of Toggenburg goats, of relatively high yields of milk. The figures of the B. A. I. are stated to be based on the milk of common American goats, of low yield.

APPENDIX B.

Standard for Anglo-Nubian Goats

1. *Type and General Appearance, 20.*—An alert, attractive and stylish appearance, showing at a glance the true characteristics of the Nubian.

Form and Constitution, 45-55.—Hair medium coarse, short and glossy; skin loose; good bone (5). *Head of Bucks.*—Masculine, hornless; nose Roman, ears heavy, large and drooping, hanging close to head, eyes large and brilliant (10). *Head of Does.*—Much finer than the bucks, but not weak; nose Roman, ears heavy, large and drooping, hanging close to head; eyes large and brilliant; hornless (5). *Neck of Bucks.*—Muscular, short and a tendency to loose skin or dewlap at throat (10). *Neck of Doe.*—Rather slender (5). *Body.*—Well proportioned, with shoulders so placed as to give a deep, wide chest and full heart girth; back straight; ribs well sprung and wide apart; hips wide apart; legs clean, strong, upright pasterns (15). *Size.*—When fully mature and in good breeding condition, bucks should weigh not less than 165 lbs. and up; does 125 lbs. and up (15).

Udder, 25.—Attached high behind, and full, but rather pendulous, deeply serrated, flexible, halves even and free from fleshiness; teats large and evenly placed, milk veins large, long, tortuous.

Bucks, 15.—Ability as breeders, size of organs, etc.

Color, 10.—Varied, preferably free from markings indicating Swiss blood.

Total.—100 per cent.

Champion.—No buck or doe under the age of 18 months to be eligible to a champion award, except in junior class. If there are no bucks showing worthy more than 90 per cent. perfection no award of champion will be made.

Hornless.—Any dehorned or disbudded animal is not considered hornless, and will be derated by the judge according to conditions shown. Cut for bucks not to exceed 20 points.

Disqualifications.—Sterility, any deformity of a serious nature, or a diseased animal.

Buck.—Name used to define male of the goat family.

Buck Kid.—Name used to define young male of the goat family.

Standard for Saanen Goats

Color.—White; any other color, spots or patches disqualifies. Black skin spots allowed. 5 points.

Size and Weight.—Does, 30 inches or more at withers. 135 lbs. 15 points. Buck, 35 inches or more at withers, 180 lbs. or more. In competition, where two animals are of equal merit, the larger shall be given preference. 25 points.

Head and Neck.—Broad forehead, well developed eye sockets, eyes large. Full nostrils, small or medium ears, erect or nearly so. Neck long and slim, with or without wattles. Well proportioned head. 10 points.

Legs.—Standing squarely under animal, strong, clean, straight, without tendency toward being cow hocked or knee sprung, upright pasterns, feet regular, hoofs clean and true. 10 points.

Coat.—Short, a longer strip along the spinal column, down the flanks and lower sides. In competition, the short coated animal to be given the preference, all other details being equal. 5 points.

Udder.—Carried high, well attached to body, globular or nearly so, and free from beefiness. Teats symmetrical and of convenient size and shape for milking. Milk veins large, long and tortuous. 25 points.

Symmetry.—Does: Head distinctly feminine. Neck long and graceful. Body should be long and deep with well sprung ribs; inclination to leanness, with abdomen well developed showing food capacity. Back, straight, hips wide apart and slightly higher than the withers. Rump broad and long, not too sloping. Strong, clean, straight limbs, well proportioned to the body. Feet true. General appearance graceful, but showing hardiness and vitality. 20 points.

Bucks: Distinctly masculine without showing coarseness, gentle expression, heavier neck and beard, and may have somewhat longer coat. Body long and deep, straight back, ribs well sprung. Good broad chest. Rump broad, but not too sloping. Strong, clean, straight limbs well proportioned to the body. Feet true. The

entire frame indicating vigor and a robust constitution. 30 points. Organs of reproduction well developed showing ability as breeders.

Horns.—A dehorned or disbudded animal showing no horn, cut doe, 5 points; cut buck, 20 points. Animal with horns, or dehorned

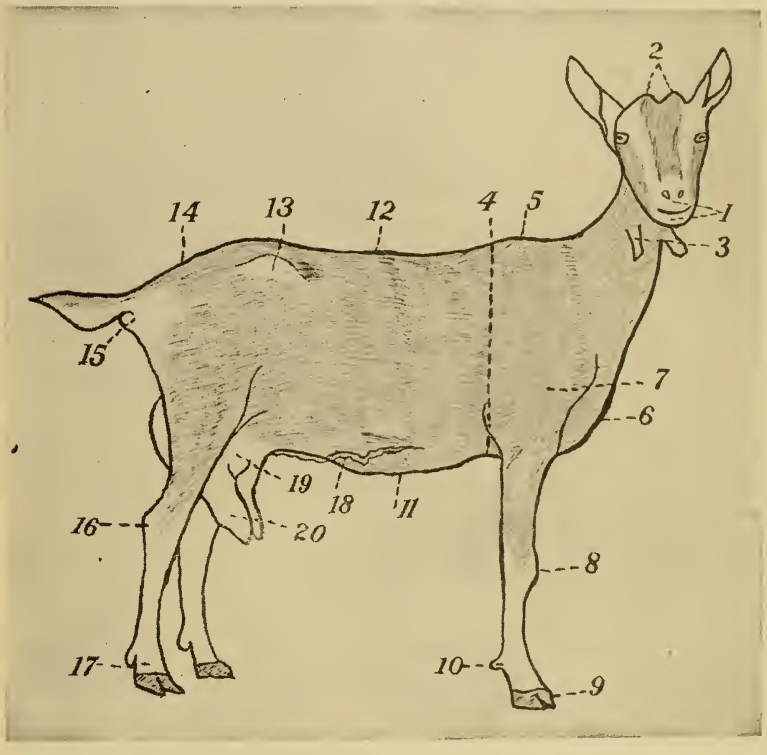


FIG. 75.—Chart showing the parts of a goat's body: 1, muzzle; 2, knobs of a hornless animal; 3, wattles; 4, heart girth; 5, withers; 6, chest; 7, shoulder; 8, knee; 9, hoof; 10, claw; 11, belly; 12, back; 13, hip bone; 14, rump; 15, pin bone; 16, hock; 17, pastern; 18, milk vein; 19, udder; 20, teats.

or disbudded showing unsightly growths. Cut does, 10 points; cut bucks, 25 points.

Disqualification.—Any off color spots or patches in coat. Sterility in bucks, barrenness in does. Any deformity of a serious nature.

Champion.—No buck or doe under the age of 18 months to be eligible to a Champion award except in Junior Classes. If there are no worthy animals in the exhibit, no Champion shall be given. If there are no bucks showing worthy more than 90 per cent. perfection, no award of Champion will be made.

Standard for Toggenburg Goats

Doe Standard.—*Color and Markings.* The body color should be solid, the acceptable color of the true characteristic Toggenburg in America shall be the same as in the parent country, Switzerland.[1] Varieties of shade are not to be penalized to such an extent as to overcome major points of excellence. Must be further marked clearly and distinctly with white, as follows: White ears, usually with a dark spot in the middle two stripes down the face from above each eye to the muzzle, white muzzle, legs white on the inner side and entirely white from the knees and hocks to the hoofs, and a triangle of white on either side of the tail. 10 points.

Coat.—The coat may range from a short smooth coat to one with hair of some length all over the body. The condition of the coat should be glossy, loose, and pliable. 5 points.

Weight, for mature animals, 100 to 135 pounds. 10 points.

Height, for mature animals the height at the shoulders should be 26 to 28 inches. 10 points.

General Conformation.—The body should be long, with well sprung ribs, a deep and well developed abdomen, straight back, broad rump, not too sloping, strong, lean, straight limbs, well pro-

[1] Author's note. At the time this standard was adopted by the American Milk Goat Record Association it was the general understanding that in Switzerland the accepted color for the Toggenburg was brown, of varying shades from dark brown to fawn or mouse color unbroken except by the characteristic pattern of white markings. But among the animals imported in 1920 there were Toggenburgs whose body color was broken by irregular spots or patches of white or who were so dark as to be described as black or who were of the type usually described as "tricolor." Toggenburgs of this last type are reddish roan with a brown belly and a stripe down the spine and the usual white Toggenburg markings. These red-white- and brown Toggenburgs and black Toggenburgs, and animals with irregular

portioned to the body, hoofs clean and true. The head should be neat, the neck slim, with or without wattles. 20 points.

Appearance of vigor and vitality, 15 points.

The Udder.—Should be well developed, but not fleshy, should not be pendulous, but well attached to the body, with symmetrical teats large enough to be easily grasped. Should show a conspicuous development of the veins leading from the mammary gland. 20 points.

Absence of Horns.—Naturally hornless animals are preferred. Does that have been neatly disbudded, without visible scar or growth of horn, are accepted. Head hornless, 10 points, neatly disbudded, 5 points.

Buck Standard.—*Color and Markings.* The same as for does, except that for the mature buck the two white lines on the face usually disappear, leaving only the white patch over the eye. 15 points.

Coat.—same as for does. 5 points.

Weight, for mature buck, 150 to 175 pounds. 10 points.

Height, for mature buck, at shoulders, 33 to 36 inches. 10 points.

General Conformation.—The back should be long and straight, with broad rump, not too sloping, well sprung ribs, deep broad chest, limbs clean, strong and straight, well proportioned to the body, hoofs clean and true. The head clean in outline, broad between the eyes, masculine in appearance. The neck strong and rather heavy, with or without wattles. 20 points.

Appearance of great vigor and vitality. 25 points.

The head should be hornless. 15 points.

---

patches of white, have appeared in our Toggenburg herds from time to time since the first importations of the breed, but there has been a tendency to regard these individuals as "off-colored," although many breeders admire the black and tricolor Toggenburgs, and have maintained that they should be considered standard colored. The adoption of the above official standard, together with the recent importation with full Swiss Registry papers, of these dark and tricolored Toggenburgs, would appear to settle the question in favor of a wide color standard for the breed. This will be a great advantage in upbuilding the Toggenburgs of America to their best capacity as dairy animals unhindered by narrow and abitrary requirements as to color.

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